

# ROADS AND STREETS

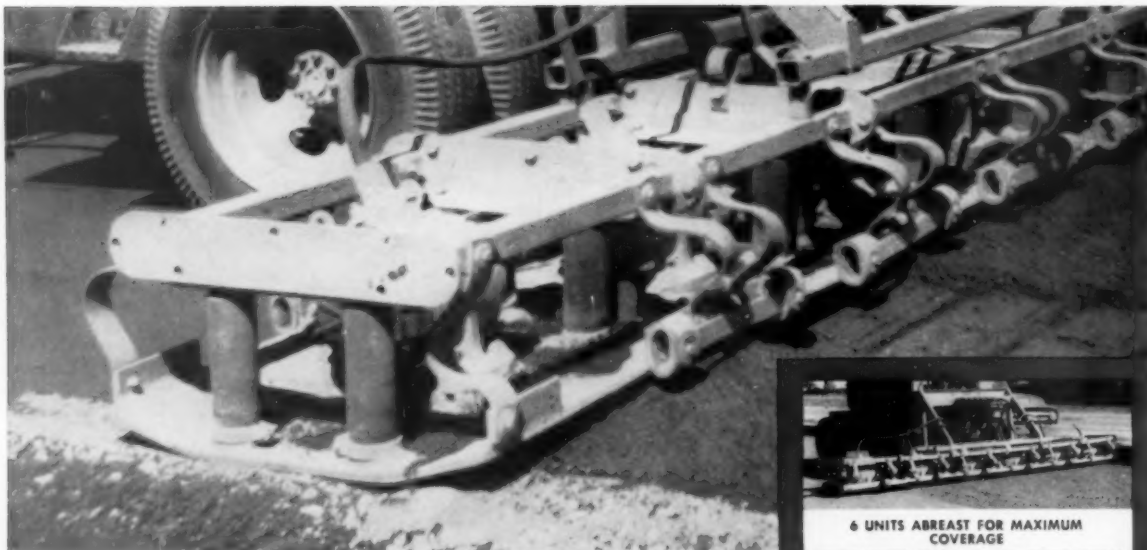
June, 1960

A GILLETTE PUBLICATION



UNIVERSITY MICROFILMS  
EUGENE B. POWEN  
313 N. 1ST ST.  
ANN ARBOR, MICH.  
COND. REV. 11-60

**Putting Good Fills With Rock  
and Mixed Materials** page 64



THE JACKSON COMPACTING SOIL-CEMENT

## 104% of STANDARD DENSITY IN JUST TWO PASSES!

... a record that has been duplicated time and again. And the JACKSON is equally effective compacting any granular soil from sand to large rock in macadam base courses, infiltrating fines and compacting fills. With each vibratory unit delivering 4200 3-TON VIBRATORY BLOWS PER MINUTE required density is reached with unmatched rapidity. Tandem hook-ups, such as shown at the right, further decrease production time on narrow jobs. Coverage can be just what you want. Even individual units can be detached and operated like standard single compactors. And both the JACKSON MULTIPLE and the JACKSON TRAILER COMPACTOR operate in either direction ... NO DEADHEADING OR TURNING REQUIRED.

The ball-bearing-mounted motors which actuate the compacting units operate far more efficiently than any belt or chain driven system and hence the fuel consumption of JACKSON COMPACTORS is much less than any other vibratory compactor of this type ... troublesome parts are eliminated and daily maintenance consists only of oiling the motors.

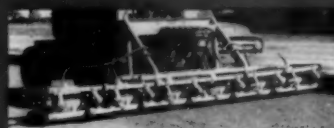
*It will pay you handsomely to get the complete facts concerning these machines before tackling any major project. See your JACKSON DISTRIBUTOR who has them for sale or rent.*



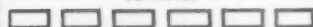
JACKSON TRAILER COMPACTOR ... may be pushed or pulled by any prime mover capable of working speeds as low as 50 FPM; towed to location at any road speed; operated in either direction; controlled by prime mover operator. Power plant supplies both single and 3-phase 110-115 volt, 60 cycle A.C. and has many uses.

**JACKSON VIBRATORS, INC.**  
LUDINGTON • MICHIGAN

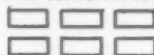
... for more details circle 330 on enclosed return postal card



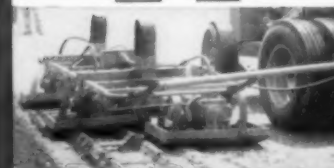
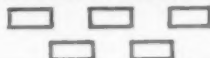
6 UNITS ABREAST FOR MAXIMUM COVERAGE



6 UNITS IN TANDEM FOR MAXIMUM ONE PASS CONSOLIDATION



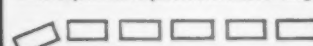
5 UNITS IN TANDEM AND STAGGERED. VARIABLE FOR A WIDE RANGE OF WIDTHS.



4 UNITS TOWED AT SIDE OF TRACTOR. IDEAL FOR ONE PASS WIDENING OPERATIONS.



SHOULDER COMPACTION IS AUTOMATIC. End unit automatically assumes this position — no adjustment required. Prevents raveling.



C09



# Bethlehem dowel units between concrete slabs of new jet runways

- serve as expansion joints
- ease load-transfer between slabs



*Bethlehem dowel units act as expansion joints and help transfer loads between slabs. Easily installed, with no delay to fast pouring schedules, these dowel units nest compactly for ease in shipping and storing at the job site.*

Under construction at Lemoore, Calif., is a new Naval Air Station, to serve as a master jet base for fleet units in the San Francisco Bay Area. Comprising nearly 31,000 acres, with two 13,500-ft-long paved runways, the facility is expected to be operational in mid-1961.

Bethlehem dowel units (type 4) were installed every 225 ft in the runways to act as expansion joints and to facilitate load transfer between slabs. Runways are 200 ft wide, 12 in. thick. After installation of the dowel units, a jet-fuel-resistant sealer was used as a filler.

Griffith Company, Los Angeles contractors, paved the airfield, under the direction of the Bureau of Yards and Docks, U. S. Navy.

**BETHLEHEM STEEL COMPANY**  
BETHLEHEM, PA.

*Export Distributor:*  
Bethlehem Steel Export Corporation

## BETHLEHEM STEEL



# ROADS AND STREETS

JUNE, 1960

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

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Form 3579 requested to be returned to Gillette Publishing Company 22 W. Maple St., Chicago.



# BEST BET FOR BIG BIDS

Let Goodyear show you ways  
to cut your tire costs

Competition for big jobs keeps you on your toes. That's why it pays to do everything possible to protect your profit margin. And much of your success on the big jobs rides on the tires you use.

Your **Goodyear Big-Tire Specialist** knows what problems you face in terrain, roads, climate, schedules and speeds. And he knows which tire is best for each need and how to keep costs in line. When you call him in for an analysis, you are assured his recommendations on tires will come from the most complete line of the world's toughest earth-mover tires.

He's ready with **On-The-Job Service** whenever you need it. Goodyear Contractor Service means that you can have a tire-maintenance program on-the-job. This service is geared to save man-hours, machine-hours and tire life.

## Plus — BIG-TIRE PERFORMANCE

### Example: SUPER ROAD LUG

Jounce it over the roughest terrain and the Goodyear Super Road Lug shrugs off flexing, cuts and piercing blows. Reason? This tire embodies new and advanced super-toughening agents that make it super-tough on wear. What's more, rugged 3-T Processed Cord (nylon or rayon)—triple-tempered by Tension, Temperature and Time—give you unequalled tire strength and stamina.

Why not get the full story on the performance and savings that make the Super Road Lug your best bet for big jobs — and details on Goodyear Contractor Service — *before* your next bid. Just call your Goodyear dealer — or write Goodyear, Truck Tire Department, Akron 16, Ohio. Remember, lots of good things come from Goodyear.



Road Lug — T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

World's Toughest Truck Tires by

# GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

ROADS AND STREETS, June, 1960

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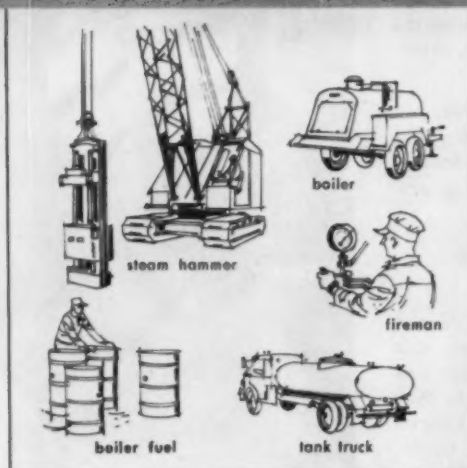
# COMPARE . . . see why steam hammers cost more!

## LINK-BELT SPEEDER diesel pile hammers

- Lower investment
- One-man operation
- Completely self-contained

# VS.

## steam- actuated hammers



By the hour, by the day, by the year, you're money ahead with **LINK-BELT SPEEDER** diesel hammers

A simple comparison between a modern Link-Belt Speeder diesel pile hammer and a steam (or air) hammer shows you the big difference in initial cost . . . operating efficiency. Steam hammers cost you more — and why shouldn't they? You have to pay for the extras: boilers or generators, tank trucks, firemen, greater fuel consumption. And you have to maintain these

extras, too, with time, money and men!

With a better-designed Link-Belt Speeder diesel pile hammer, just one man controls both hammer and crane . . . from the cab. Setup is easy. Put hammer in leads, that's all! Hammer ratings up to 7,500, 18,000 and 30,000 ft.-lbs. per blow. For further details, see your distributor. Or write for Diesel Pile Hammer Bulletin No. 2582-A. **LINK-BELT SPEEDER CORPORATION**, Cedar Rapids, Iowa.

102-60N

## LINK-BELT SPEEDER



Also builders of a complete line of shovel-cranes . . . 1/2- to 3-yd., 8- to 75-ton capacities.

. . . for more details circle 337 on enclosed return postal card

## ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 68 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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# NO. 12 MOVES FLEXIBLE BASE FAST —UP TO 3800 CU. YD./10 HR. DAY

The No. 12 pictured above is one of 4 Cat Motor Graders working on an Interstate Highway improvement contract being handled by T. L. James & Co., Inc. and R. W. McKinney of Corsicana, Texas. The 7-mile paving job is near Richmond, Texas, and calls for 62,178 cu. yd. of concrete plus 98,740 cu. yd. of gravel and 95,420 cu. yd. of flexible base.

To keep production high and on schedule, these contractors rely on the No. 12's superior performance and operating efficiency to move flexible base fast. Equipped with a 14-ft. blade, this unit spreads 3600 to 3800 cu. yd. per 10 hr. day.

This is the kind of production and dependability you can expect from the 115 HP Cat No. 12... now, more than ever, with the many improvements incorporated in the *new* Series E model.

The most notable improvement is the new compact engine which provides greater lugging ability in tough going, long life and easier servicing. Horsepower remains the same (115) but this new engine develops higher torque and gives the No. 12 greater load-handling capacity. Besides a new compact engine, the No. 12 Motor Grader now has the dry-type air cleaner as standard. Removing 99.8% of all dirt from intake air this cleaner can be serviced in 5 minutes... cuts maintenance time by as much as 70% and substantially reduces cost... extends engine life.

Still retained are the many important features that have made the No. 12 the leader in its class. There's the oil clutch, providing up to 2000 hours without adjustment... the equivalent to 12 months of operation. Ample clearance between the top of the moldboard and the bottom of the circle drawbar provides greater rolling action... allows more material to move across the blade. Improved mechanical controls make engagement easier. Blade controls have a mechanical lock to insure positive blade position. When control is in neutral, the power shaft is locked by a set of gear teeth to prevent creeping.

These are just a few of the reasons why the NEW Cat No. 12E Motor Grader is out front. To get the complete picture, see your Caterpillar Dealer. He'll show you proof of top performance with an on-the-job demonstration!

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

## CATERPILLAR

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**STEP UP  
PRODUCTION WITH  
THE IMPROVED NO. 12**

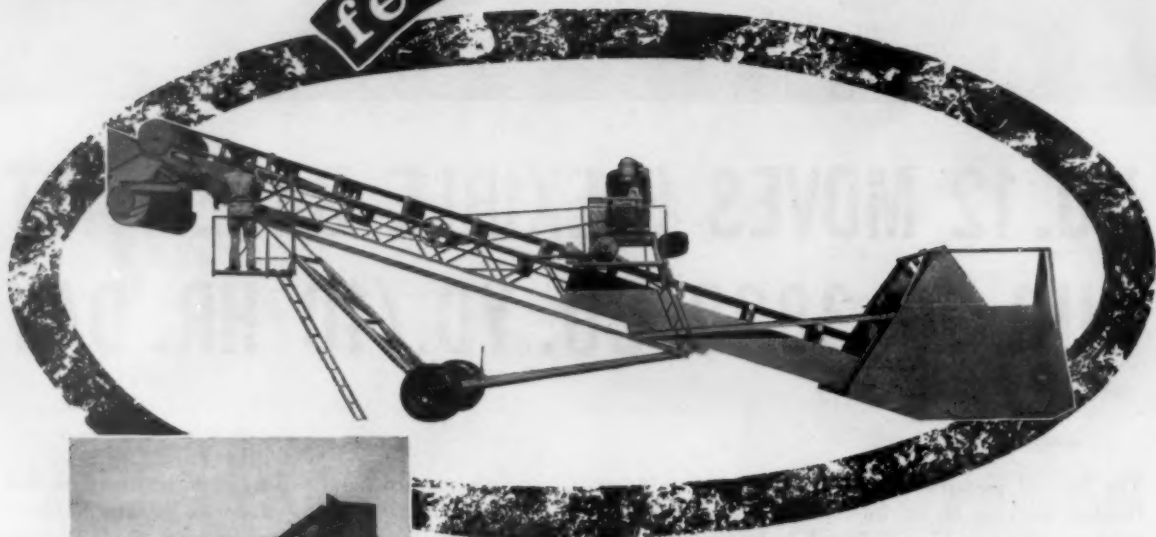
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pugmill  
feeder trap  
conveyor  
feeder

**4-in-1 VERSATILITY**

IN THE

**TRAVELER**



**A Portable, Single-Shaft Central-Mix  
SOIL STABILIZATION Plant by BOARDMAN**

This portable stabilization plant offers you four-in-one versatility, yet it requires just *one* power unit, just *one* prime mover, just *one* control operator!

Move the Traveler into place and be in operation in just over one hour. Convert it quickly to serve your specialized requirements: remove the pugmill for a portable conveyor-feeder, remove the feeder and trap for a belt-conveyor on wheels. And its progressive BOARDMAN design gives you up to 400 tons of stabilized base every hour—top capacity at competitive prices!

Send a post card today for complete specifications, prices and technical literature by return mail. The Traveler is waiting to help you!

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**THE BOARDMAN CO.**  
1401 S. W. 11th • OKLAHOMA CITY

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**Rolls over  
all obstacles  
to profits!**

**NYGEN-BUILT**

# **GENERAL TIRES**

**reduce downtime losses  
to build up more profit for you!**

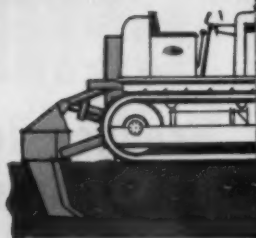
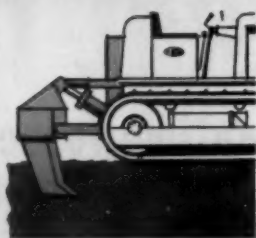
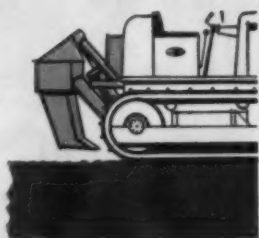
Projects that rip ordinary tires and schedules to shreds are naturals for extra rugged General Off-the-Road Tires. With stronger-than-steel Nygen cord construction and a deep-digging, high-flotation tread, Generals are built to take on rock, stumps, mud, sand without let-up or let-down. And that means more work done...more profit counted every day of the job! Be sure of both on your next project with General Off-the-Road Tires.



**THE GENERAL TIRE & RUBBER CO. • AKRON 9, OHIO**



The unique parallelogram design of Allis-Chalmers rippers keeps shanks at the most effective angle . . . up . . . halfway down . . . down full depth.





# TOUGH TOOLS MATCH TOUGH JOB POWER

Allis-Chalmers rear-mounted rippers maintain most effective penetration angle at all depths... up front, specially designed bulldozers make most of HD-21's tremendous power.

Modern tractor power, *plus* modern ripper and dozer design, is making a big difference on today's tough jobs. With the HD-21 and ripper, for instance, up to 60,000 pounds of draw-bar pull let you rip 'n' doze what you once shot and shoveled... puts one man, one modern machine in place of a typical 4-man blasting operation.

Allis-Chalmers leads the field in making rippers practical and effective for these tough jobs. The introduction of *parallelogram design* — unique Allis-Chalmers feature on these big HD-21 rippers — keeps shanks at most effective penetration angle at all depths. You get the *same* effective tooth angle... up... halfway down... or working a full two feet deep!

In addition, Allis-Chalmers dozer design utilizes the latest developments in steel to produce durability which makes the most of today's big tractor power without profit-killing maintenance and repair. Trunnions, "C" frames, struts and moldboards match the HD-21's brute strength. If you're bidding or working *any* tough materials, your Allis-Chalmers dealer will furnish all the facts on successful ripper/dozer application. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.



move ahead with

**ALLIS-CHALMERS**  
power for a growing world



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### How to return stored engines to service

In a previous issue of Lube Logic we gave you an 11-point program designed to protect gasoline and diesel engines during long idle periods. Now we'd like to finish what we started by describing the routine for taking engines *out* of storage and putting them back into action.

**1** Where Texaco Rustproof Compound L has been applied to exterior of engine, remove with kerosene.

**2** Remove waterproof paper and tape from all openings.

**3** Remove spark plugs. Clean them and check the gap settings before replacing.

**4** Remove distributor cap and clean Texaco Rustproof Compound L thoroughly from lobe of breaker cams. Replace cap.

**5** Check the level of the crankcase oil. If it's at the full mark, there's no need to drain the oil before operating the engine unless it requires a different grade. If the oil has fallen below the full mark during storage, drain the engine and locate the oil leak, and repair it, then refill with the proper grade of oil, before operating the engine. The first oil change after the engine is back in service should be made in half the usual period.

**6** Check the cooling system for leaks, and add water or Texaco PT Anti-Freeze if necessary. It's not necessary to drain and flush if the cooling system was filled with a rust-inhibited anti-freeze before storage.

**7** Fill the fuel system, start the engine, and let it run for a while. Check the oil pressure, and check for overheating and oil and fuel leaks.



### End-of-shift is the best fueling time

They say there's a time and a place for everything, and for refueling equipment the best time is at the end of each day's work. And here are two reasons why. End-of-shift minimizes the possibility of fuel-tank rusting, because there's no room for condensate to form in a tank that's full of gasoline or diesel fuel. And tank-bottom sediment, stirred up by pumping in fuel, has a chance to settle down overnight, so it won't be drawn into the fuel line.

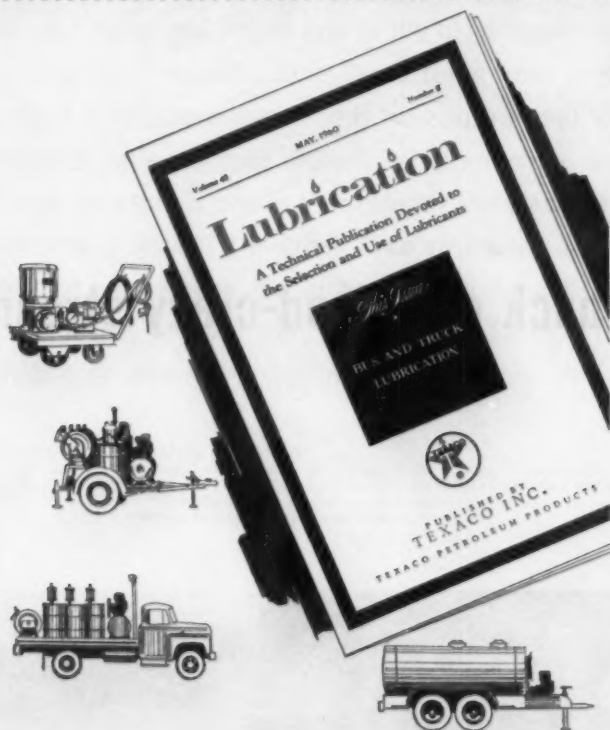


### Spark plug tip: Degrease before you blast

Don't depend on your spark plug cleaner to do everything. As a matter of fact, you can actually make things worse by blasting an oil-fouled plug. Heavy oil deposits on the plug will pick up the abrasive and hold it in the recesses between the shell and the insulator. Result: burning and ultimate failure because these deposits can seriously affect the spark plug's ability to dissipate heat at high engine speeds.

**Moral:** degrease oil plugs in a suitable solvent and dry them *before* you blast.

# prolong equipment service life

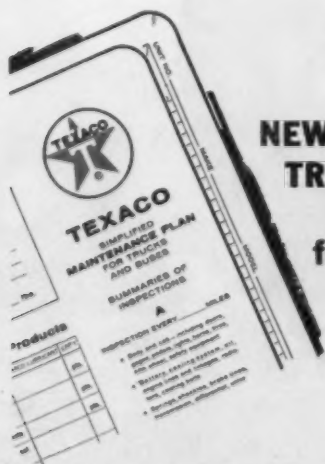


## The whole truth about mobile LUBE RIGS

- What good lube rigs are made of—the products and the dispensing equipment.
- How to use lube records to make your rig more valuable.
- Special purpose lube rigs.
- Pros and cons of mobile and centralized lubrication.

What does it take to make a mobile lube rig? What do you put on it? How do you use it? The questions have been coming in so fast lately that Texaco has devoted a whole issue of its magazine, *Lubrication*, to answering them: the March 1960 issue, titled "Mobile Lubrication Equipment."

Lubrication is a major factor in cost control, and lube rigs can be a major factor in thorough maintenance, so send for your free copy of the March *Lubrication*. Supply of these valuable booklets is limited, so if you want one, send in your request now to Texaco Inc., 135 East 42nd Street, New York 17, N. Y., Dept.



## NEW TRUCK RECORD FOLDER fits itself into your schedule

Texaco's flexible new truck record folder lets you stick to the lube schedule that works best for you without running into bookkeeping problems. Lubrication and oil schedules are completely separate from mechanical maintenance and replacement parts schedule—you don't have to follow any pre-established routine to use the folder profitably. And this new folder accounts for every single dollar you spend on truck maintenance for a whole year. Get yours now.

... for more details circle 360 on enclosed return postal card

ROADS AND STREETS, June, 1960

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV



## TEXACO LUBRICATION ENGINEERS

Every now and then we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in money and time can be made. If Lube Logic doesn't solve your problems, call your local Texaco man. Anytime, all the time, he's your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control."

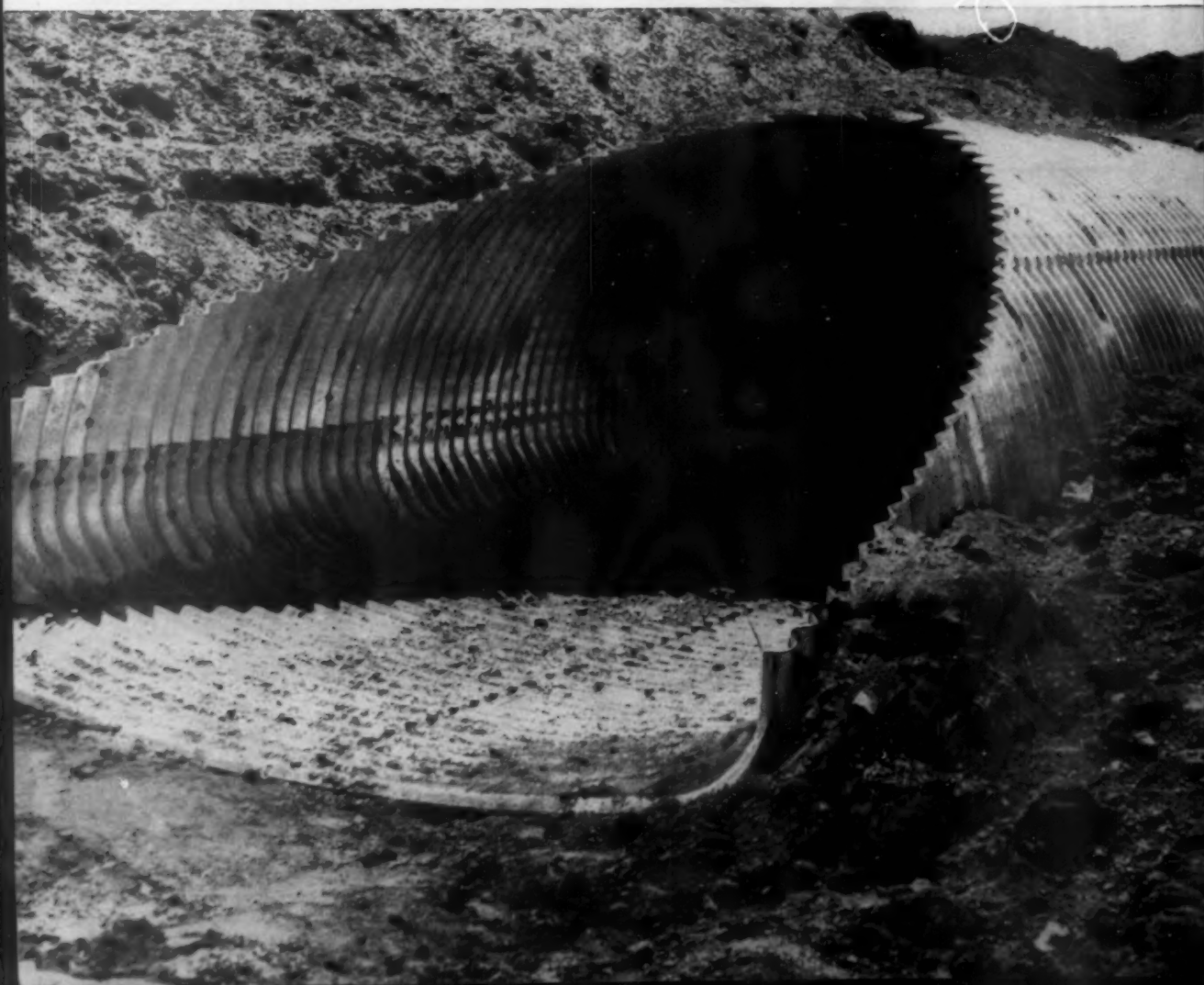
Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

**TEXACO**   
Throughout the United States

Canada • Latin America • West Africa

R-10

## **This pipe broke the back of a flood-crazy stream**





You're looking at a giant USS AmBridge Sectional Plate pipe-arch (12'-10" x 8'-4" x 322'-0" long) erected by the Leon Joyce Co. of Minnesota. It handles the run-off from the Bitter Creek watershed near Zumbrota, and is one of the biggest drainage structures ever installed in Minnesota.

□ After a heavy rainfall, Bitter Creek turns from a gentle, slow-moving stream into a raging torrent of destruction. Flash floods have aggravated local townsfolk and farmers for years. But in this new, wide-mouthed sectional plate structure, the water simply runs itself out. □ The huge drainage structure is one of four recently installed within a 10-mile area as part of a new four-lane highway system. The other three structures are slightly smaller. USS AmBridge Sectional Plate pipe, pipe-arches and arches are permanent. They won't crack. Won't break. And installation is faster, because there's no need for forms. Write or contact any one of our offices for information on *American Bridge Highway Products*.

*USS, AmBridge and I-Beam-Lok are registered trademarks*

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**Division of**  
**United States Steel**



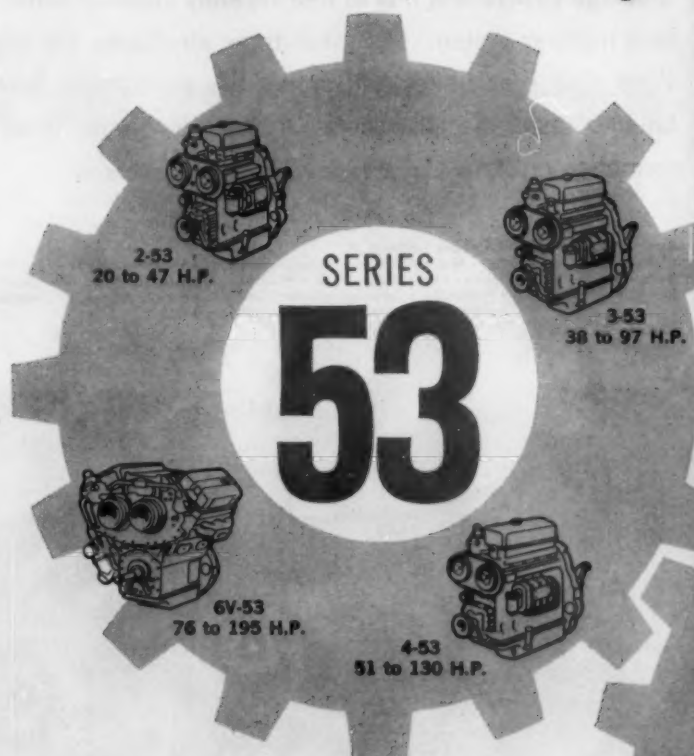
USS AmBridge Highway Beam Guard rail and Posts help safeguard traffic. This rugged, flexible steel beam guard rail is highly visible. It bolts easily but firmly to steel posts and is available in 12'-6" and 25' lengths to minimize splicing.

USS AmBridge I-Beam-Lok is a sturdy, lightweight bridge flooring. It installs quickly, easily with less traffic interruptions. The filled type is available in units 6' wide and up to 40' long that apply directly to stringers on spans from 6' up to 8' centers. The open type is also available for spans up to 4' centers.



# GM sets the standard for DIESEL

# ALL- PURPOSE POWER LINE



"A family of engines geared to every job." The farsighted engineering design which has made this statement a reality enables you to get all the savings built into the family of Series 53\*, 71\* and 110\* engines. Yet you can still buy or specify your exact engine requirement.

You get engines tailored in power, size and weight to your exact needs—20 to 1650 H.P. in only three cylinder sizes.

Because of wide interchangeability of parts within the family, replacement parts cost less. You can protect new engines with current parts inventories. You can also meet changing horsepower needs and still keep the benefits of present operating know-how, maintenance training and existing parts inventories.

Wherever you use engines, you'll find Series 53\*, 71\* and 110\* GM Diesels will raise your productivity—and profits. Your GM Diesel distributor can prove it—he's in the Yellow Pages under "Engines, Diesel," or write us direct.

\*Refers to cubic inches displacement per cylinder.

# DIESEL PRODUCTIVITY

## of engines geared to every job

CHOOSE FROM THREE SERIES...20 TO 1650 H.P....ONLY THREE CYLINDER SIZES

**SERIES 110**

- 6-110: 160 to 335 H.P.
- Twin 6-110: 320 to 670 H.P.
- 8V-71: 150 to 336 H.P.
- 12V-71: 224 to 504 H.P.
- 16V-71: 300 to 675 H.P.
- 24V-71: 448 to 1008 H.P.
- 32V-71: 600 to 1350 H.P. (Turbocharged—1650 H.P.)
- 6V-71: 112 to 252 H.P.
- 4-71: 69 to 167 H.P.
- 3-71: 51 to 118 H.P.
- 2-71: 33 to 67 H.P.

**SERIES 71**

**GM DIESEL**

DETROIT DIESEL ENGINE DIVISION,  
GENERAL MOTORS, DETROIT 26, MICH.

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Parts and Service Worldwide

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# "WE DRILL UP TO 3,000 feet with each Timken® carbide insert bit"

Site: Oregon's  
Hills Creek Dam

ROCK: BRECCIA TUFF,  
HIGHLY ABRASIVE

Special report from  
Green Construction Co.  
and Tecon Corp.

Drilling blastholes for the \$40,000,000 Hills Creek Dam near Oakridge, Oregon—that's when Green Construction Co. of Des Moines and Tecon Corp. of Dallas encountered Breccia Tuff, a highly abrasive rock with big angular fragments. They used Timken® carbide insert bits. With reconditioning, each Timken bit drilled from 2,500 to 3,000 feet!



... for more details circle 361 on enclosed return postal card

18

## Which Timken bit should you use?

The Timken carbide insert bit is the most economical bit you can use for hard, abrasive ground. But in softer ground use the low-cost Timken all steel multi-use bit. Or use both bits in changing ground—they're interchangeable in the same thread series. Dozens of different Timken bits fit the same drill steel. All are made from Timken electric furnace fine alloy steel. All have special shoulder unions that protect threads against drilling impact. Let our engineers help you choose the right Timken bit for *your* job. Phone or write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

**TIMKEN®**  
removable rock bits

ROADS AND STREETS, June, 1960



## ROADS AND STREETS

Sixty-Six Years of Editorial Leadership

# Washington News Letter



By Duane L. Cronk, Director, Highway Information Services, Inc.

June 10, 1959

Congressman John Blatnik's subcommittee investigating the conduct of the National Highway Program laid a "real-for-sure" highway scandal on the table last month and proceeded to document its findings of fraud, faulty construction, collusion, and falsification of records. A procession of witnesses who had been engaged on the Oklahoma state highway department project - an Interstate bypass around Tulsa - testified that:

State inspectors had written false reports and filed phoney samples of materials for testing purposes.

The contractor had been paid for materials not delivered.

A state highway commissioner had drawn payments from a construction firm holding state contracts, apparently as a profit-sharing partner. (During the year in which the commissioner received such funds, this outfit's net profits on gross revenue reportedly hit a tidy 42%.)

The Bureau of Public Roads had approved state reports without questioning them.

One of the personalities involved took the fifth amendment because he is currently under indictment in Oklahoma. Another came to Washington under police protection. As others spilled out the disturbing details, it became evident that the federal-aid highway program, so long a matter of pride in professional engineering circles, was suffering the most scornful appraisal on the national level in many, many years.

\* \* \*

The aggressive team of investigators working for the Blatnik committee was successful in making a point of far greater significance than that a patch of crookedness had been woven on a short stretch of highway in the Southwest. They were out to prove that "it could happen anywhere" and furthermore, that "it probably is." In short, the examiners sought to demonstrate that the whole long line of command from the BPR, through the state highway department and down to the inspector on the job relies too heavily on personal integrity, and that the absence of proper checking procedures is failing to protect the public highway dollar from skullduggery and graft.

Committee Counsel Walter concentrated his fire on the Bureau's area engineer, a veteran of 26 years service, early in the hearings and extracted from him the statement that the BPR depends "rather completely" upon the validity of state reports and does not undertake independent tests to safeguard Uncle Sam's 90% stake in Interstate jobs.

"Does the Bureau of Public Roads expect you to go behind these reports," Counsel May asked. When BPR Engineer Ralph Glover replied, "No," the rest of the hearings

(continued on next page)

were mostly for effect. Confronted with these revelations of dishonesty on the part of state men and contractors, Federal Highway Administrator Bertram D. Tallamy told the committee he was shocked, distressed, and disgusted.

"These men ought to be ashamed of themselves," he said.

Effective immediately, he announced, BPR engineers will be asked to make spot checks of newly completed pavement and oversee the testing. The Bureau will also insist hereafter that test borings be made at random on any project for which a final voucher is being submitted, again with opportunity for BPR observation. And a new sign will be posted on every federal aid project warning everyone concerned that wrong-doing can bring a \$10,000 fine or five years in prison.

Mr. Tallamy kept reminding the committee, however, that under the tradition and the legislation governing the National Highway Program the federal government cannot assume responsibility for what are supposed to be state projects. It was also brought out that although the BPR has requested additional staff to do a better job, it has been turned down. The agency asked for 186 more men this year; the Bureau of the Budget cut it down to 77; and Congress reduced it even further, to 40.

\* \* \*

The state highway officials, also, have decided that even their repeated warnings against laxity is not enough. Last week, a special AASHO committee sat down in Washington and drafted some guidelines for states to follow in assuring quality control on future jobs. They want the states to initiate a series of checks, not only against field engineers, but also against right-of-way agents as well.

Meanwhile, George Martin, staff director of the Congressional Committee, declared that the Oklahoma expose was "just a pilot operation," and during the next eight months his men will discover "a helluva lot of other abuses" - in lack of coordination between agencies involved in the National Highway Program, in faulty construction, in questionable right-of-way purchasing and contract procedures.

Materials experts testified during the hearings last month that the contractors on the Oklahoma project drew more than half a million dollars for work not performed or in the quality or quantity of materials not supplied - about 15% of the total cost of the job. But the loss of public confidence in the ability of the highway fraternity to discover its own mistakes and to correct them may be even more costly. The Blatnik committee - with its beginning staff of ten investigators and a 1960 budget of \$295,000 is going to be poking around in state highway departments and on contractors' jobs for a long time to come. Therein lies the real effect of the Oklahoma affair as far as road builders in 49 other states are concerned.

\* \* \*

Not all news is bad news . . . Contract awards are coming in at a great pace and Washington officials are still predicting that the second quarter will be a big one. Can the states keep up the pace? Some say yes; some say there will be a slight tailing off as the summer progresses. But after the sharp cut-back taken under the contract controls plan, the new rush of work looks mighty good to the industry. And hopes for the balance of 1960 are optimistic, even if guardedly so in some quarters.

The Better Highways Information Committee is rolling along on its fund-raising campaign toward an objective of \$325,000 for a program of publicity and public education to bolster support for the Interstate Program. A seasoned administrator, George Foster, from the Indiana State Highway Department, has consented to serve as executive secretary. Plans are a-making for a national celebration of the launching of the accelerated road building program on July 1, four years ago.



B.F. Goodrich

# Copter hop over the new Niagara

Ride in the Bell Ranger  
and see how B.F. Goodrich  
tires help build the world's  
mightiest power project

**SOON THE CHURNING WATERS** of the Niagara River will be generating more electrical power than ever—over two million kilowatts, enough to light a city the size of Chicago.

More electricity at lower cost is what we'll get from the \$720-million Niagara Power Project, one of the biggest peace-time construction jobs in our history.

Already trucks and other earth-movers have shouldered their loads more than 800,000 times—enough trips to take them ten times around the world.

To cope with the challenges of this and other tasks, Merritt-Chapman & Scott Corporation, largest contractor on the project, uses B.F. Goodrich tires and other products.



**NOW WE'RE AT 3,000 FEET.** Below us is the entire Niagara Project. At the upper right are the Falls. At upper left,  $2\frac{1}{2}$  miles above the Falls, is the Intake Area. Here water will be diverted from the Niagara River into 2 giant covered conduits, each of which is as wide as a 4-lane highway and 5 times higher than the Holland Tunnel. These conduits

take the water into the vast Storage Reservoir. From there it moves to the new Niagara Generating Plant, where it plummets down to drive 13 generators. Turn the page and learn how this mammoth job is progressing with the aid of B.F. Goodrich tires.

*This B.F. Goodrich report continues ►*



**B.F. Goodrich**

**SWOOPING DOWN** we come over the conduit area that will carry water from the Niagara River to the new reservoir. Excavations for the 46'-wide covered conduits are 110' x 50'. The trucks below us, hauling away rocks, are equipped with

B.F. Goodrich tires. Altogether, more than 2100 B.F. Goodrich tires—on dump trucks, loaders, graders and other equipment—work 'round the clock, six days a week, rolling over rock-strewn Niagara excavation sites.

## See how 2100 B.F. Goodrich tires



**B.F. GOODRICH ROCK SERVICE TIRES** have run up amazing service records at Niagara—over 5,000 hours in some cases! The new B.F. Goodrich Cut Protected tread compound is outstandingly successful at withstanding cutting and chipping from abrasive Niagara rock. Massive double-chevron Rock Service cleats give extra traction in forward or reverse. And because of the B.F. Goodrich Flex-Rite Nylon cord body, Rock Service tires are almost immune to heat blowouts and flex breaks. Result: you get more original-tread hours of service, more retreadable tires.





**TO GIVE CONTRACTORS** what they need when they need it, B.F. Goodrich built a warehouse near the Niagara project. A complete line of B.F. Goodrich tires is stored, ready for every emergency. At the B.F. Goodrich Tire Service Building on the job site, a crew of trained tire maintenance men works in shifts, 'round the clock.

**IT'S AN EMERGENCY**, and the B.F. Goodrich Tire Service Man is there. He's trained to handle any type tire on any type equipment. He has at his disposal all the latest power tools, such as hydraulic cranes, pneumatic wrenches, bead jacks. Background: 13 penstocks at Niagara Generating Plant will direct torrents of water into giant turbines. Penstocks are 462 feet long.



## are helping men harness Niagara

From the beginning of work on the Niagara Power Project, B.F. Goodrich on-the-scene specialists have helped determine exactly the right B.F. Goodrich product for each particular job. In addition to Rock Service tires (now available in the new Cut Protected compound), B.F. Goodrich Rock Logger, Tractor Grader, All-Purpose, Mud-Snow and Power Express tires are at work.

B.F. Goodrich hose feeds air to machines drilling dynamite holes. B.F. Goodrich rain suits, gloves and footwear protect hundreds of construction workers.

B.F. Goodrich conveyor belts will carry materials for 1,300,000 cubic yards of concrete, total required for the entire generating plant. And helping to keep the whole project humming are special B.F. Goodrich maintenance and service facilities—all part of the new B.F. Goodrich Unified Contractor Program.

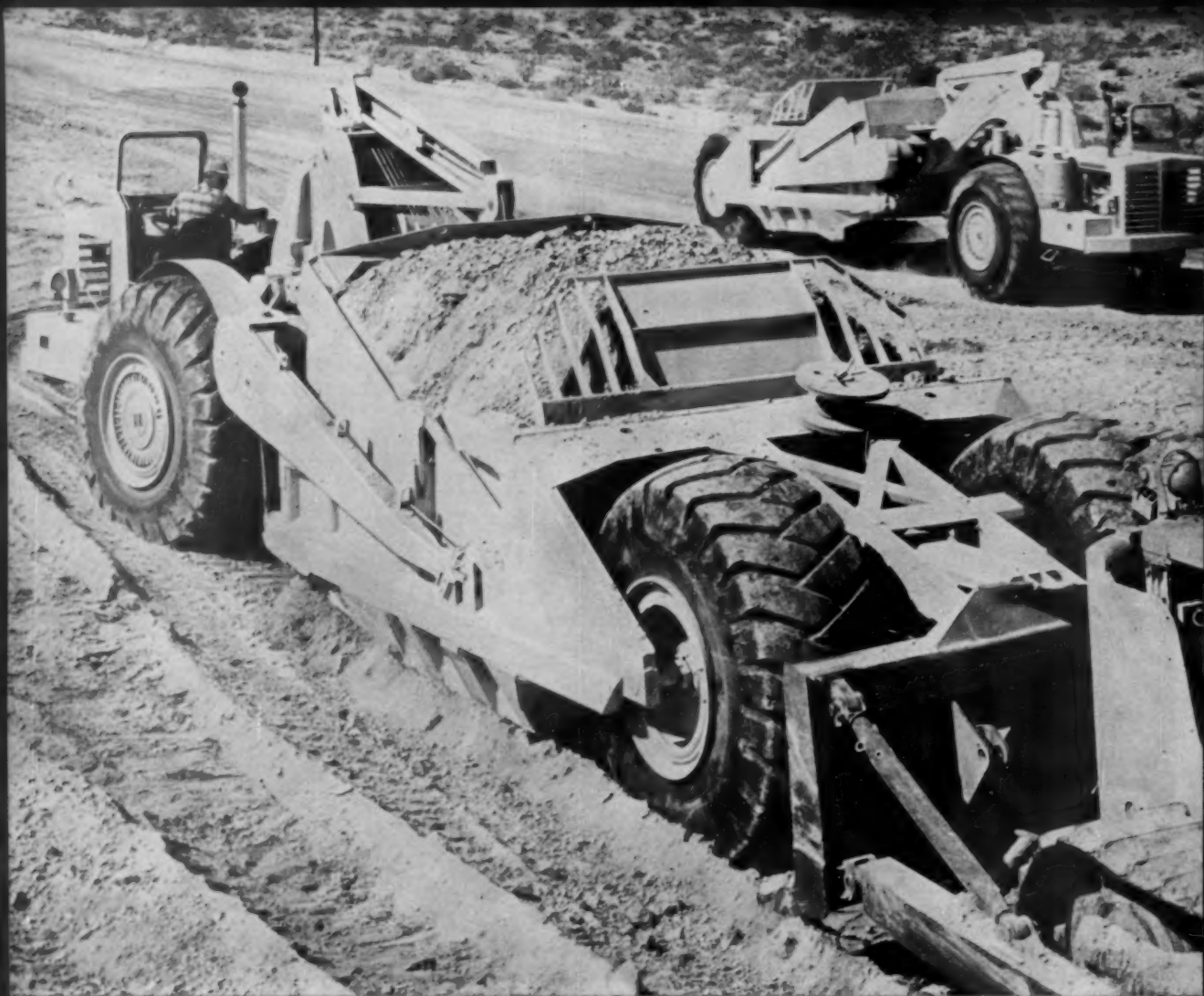
No matter what your off-the-road job, B.F. Goodrich is ready to serve you, and help you save. Your Smileage dealer is listed under Tires in the Yellow Pages of your phone book. *The B.F. Goodrich Company, Akron 18, Ohio.*

**SPECIFY B.F. Goodrich Tubeless or tube-type tires when ordering new equipment.**



# B.F. Goodrich *off-the-road tires*

... for more details circle 314 on enclosed return postal card



With the planet-powered 230-hp TD-25 pushing—and with 375 high-torque International Diesel hp under the “295’s” hood—you heap on 34-cu. yd. with amazing new speed. Even in toughest loading conditions, “X”-member reinforcing maintains perfect Payscraper push-frame alignment!

Note that the Payscraper apron lifts to a big 94-inch opening. Two ejector-plate pushing members apply dozer-like action to force out the whole 34-cu. yd. load cleanly. The 122-inch bowl width speeds unloading, and loading, too—adds control ease and stability, loaded or empty.



# How Payscraper's power and power controls boost your dirt-on-fill delivery!



**You get highest power-to-payload punch** of all rubber-tired rigs in the 34-cu. yd. International 295 Payscraper. The fast-slugging, high-torque 6-cylinder International DT-817 Diesel is the Payscraper power plant.

The direct-start, 375-hp DT-817 is turbocharged to give you all-altitude, high-efficiency performance—power for cycle-speeding rim-pull—plus time-saving “no-lag” control power!

**You power-shift** the Payscraper, up or down—and the 4-speed planetary-type, torque-converter transmission provides load-speeding *automatic* direct-drive lock-ups in second, third, and fourth gears!

**You power-steer** the 150,000-lb. loaded Payscraper almost as easily as a 3,600-lb. automobile. Payscraper gives you the big control advantages of (1), exclusive International rack-and-pinion plus tandem pump steering system; and (2), 3-degree forward spindle pitch that

improves scraper balance and prevents “nose-downs” in high-speed turns!

**You power-control** Payscraper dirt-handling actions with fingertip ease with the International PTO-driven Cable Control Unit. One cable drum of this simple planetary system actuates the apron and ejector; the other drum positions the bowl to control loading and spreading! Reach-easy Payscraper power brakes give you fast, positive stopping!

**Ease into the bump-smothering** Payscraper seat—press the direct-start button—power-shift the outfit into action. Compare the speed of loading, roading, and dumping the 122-inch bowl. See how the advantages of DT-817 Diesel power and complete, positive Payscraper power control can boost your dirt-on-fill delivery. Choose the 2-axle “295,” or 3-axle, 34-cu. yd. “495.” See your International Construction Equipment Distributor for a demonstration!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!



**International<sup>®</sup>  
Construction  
Equipment**

International Harvester Co.,  
180 North Michigan Ave., Chicago 1, Ill.  
A COMPLETE POWER PACKAGE

**Positive power-control** of all operations adds safety, builds operator confidence—makes him “haul-speed minded” to help you get full capacity and profit from Payscraper speeds up to 33.5 mph. For example, safe, effortless tandem-pump power-steering leaves “the steering feel in the steering wheel”—gives positive, one-hand control!





**Bold new Link-Belt Speeder  
truck-crane ratings**

**...your best cost/capacity**





Now with Link-Belt Speeder,  
you can move up in  
machine capacity without  
a price penalty . . .  
handle bigger loads at  
extended boom radii!

# buy

Greater lifting capacities without a cost penalty is Link-Belt Speeder's newest contribution to truck-crane ratings. Look over the line-up of capacities at the right . . . see why only one line of truck-crane reaches out for bigger profits.

New accuracy, new safety, too, with exclusive Speed-o-Matic power hydraulic controls: independent rapid boomhoist for power-raising and power-lowering of boom; power-controlled load-lowering clutches for either or both main drums.

#### FAST STRIP-DOWN

Exclusive Full-Function Design provides separate power flows for each machine operation with every and all functions *completely independent!* Strip-down for legal highway travel (when necessary) as fast as 45-min. on bigger rigs.

Have your Link-Belt Speeder distributor pinpoint your best cost/capacity buy. For detailed catalogs of truck-crane in the 10- to 40-ton capacity range, write LINK-BELT SPEEDER CORP., Cedar Rapids, Iowa. 112-5974



HC-78A (30-ton rating)  
A 30-ton truck-crane at 25-ton  
cost . . . 8' wide.

Capacity\*  
100' boom at practical 30'  
working radius . . . 18,500 lbs.  
100' boom at practical 50'  
working radius . . . 8,170 lbs.  
\* with outriggers set



HC-98A (35-ton rating)  
At extended boom radii — where  
the big share of truck-crane  
profits are made — you out-ton,  
out-profit competitive rigs.  
But you pay nothing extra!

Capacity\*  
100' boom at practical 30'  
working radius . . . 24,980 lbs.  
100' boom at practical 50'  
working radius . . . 13,060 lbs.  
100' boom at practical 60'  
working radius . . . 9,900 lbs.  
\* with outriggers set



HC-108A (40-ton rating)  
Handles lifting capacities at  
extended boom radii formerly  
reserved for 45- and 50-ton rigs.  
Your cost is still 40-ton  
truck-crane dollars!

Capacity\*  
100' boom at practical 30'  
working radius . . . 31,920 lbs.  
100' boom at practical 50'  
working radius . . . 16,960 lbs.  
100' boom at practical 60'  
working radius . . . 13,000 lbs.  
100' boom at practical 70'  
working radius . . . 10,340 lbs.  
\* with outriggers set

## LINK-BELT SPEEDER



21 crawlers

6 truck cranes



4 self propelled

It's time to compare . . . with a Link-Belt Speeder

. . . for more details circle 334 on enclosed return postal card

## FRONT COVER SCENE



The cover scene this month is dedicated to the problem of aggregate supply in the highway program. With crushed specification materials required to the tune of hundreds of millions of tons annually, the spotlight is trained on the dwindling supply of high-grade, readily accessible materials in many areas.

The equipment pictured here is part of the multiple-plant operation of Henry L. Stafford, contractor of Lubbock, Texas, who specializes in producing and placing flexible base

materials for West Texas roads. The Cedarapids unit shown is being fed with caliche (the rock truck is an International Payhauler). The Stafford Company procures some 2,500,000 tons of material yearly from a succession of pits; hence its dependence on highly portable, unitized crushing and screening plant units which can be moved quickly and assembled into the right combination for a given pit or ledge material.

## Recent Bid Trends

Reflecting the intense competition for the available jobs, state bid prices in 1960 for the first quarter dropped 2.7 percent below the previous quarter, federal highway administrator Bertram D. Tallamy announced. This drop follows a previous 0.6 percent quarterly decline. Earth-moving price showed the largest decline, down 5.2 percent in the 1960 first quarter.

## Meetings Ahead—

NEW YORK STATE BITUMINOUS CONCRETE PRODUCERS ASSOCIATION—Midyear Meeting, Queensbury Hotel, Glens Falls, New York; June 13-14.

NATIONAL BITUMINOUS CONCRETE ASSOCIATION—Midyear Meeting, Concord Hotel, Kiamesha Lake, New York; July 17-20.

AMERICAN ROAD BUILDERS' ASSOCIATION—Directors' Meeting, ARBA Headquarters, World Center Building, Washington, D. C.; July 25.

AMERICAN PUBLIC WORKS ASSOCIATION—Public Works Congress and Equipment Exhibit, Manhattan Hotel and Coliseum, New York City; August 14-27.

NATIONAL HIGHWAY CONFERENCE FOR COUNTY ENGINEERS AND OFFICIALS (ARBA sponsorship), Atlanta, Georgia; September 19-21.

Annual Meeting of AASHO, Sheraton-Cadillac Hotel, Detroit, Mich., Nov. 28-Dec. 2.



**Concrete mix would  
grind the markings  
off most tapes!**

This is Lufkin's Mezurall® tape . . . with unmatched Chrome Clad® blade that fights concrete, sand, mud and other abrasives.

Lufkin starts with a special tempered steel . . . bonds the markings to it. Then layer after layer of electroplating is applied, topped by a final layer of tough chrome. There's no other blade like it. Comes in 6', 8', 10' and 12' lengths . . . either 1/2" or 3/4" widths. The Lufkin Rule Company, Saginaw, Mich.

**THE LUFKIN RULE COMPANY**  
TAPES • RULES • PRECISION TOOLS

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## People

### H. H. Harris, Virginia Highway Commissioner

Howard H. Harris, veteran career man in the Virginia Department of Highways, has been appointed Commissioner, filling the unexpired term of the late Samuel D. May.

Prior to his immediate past position as administrative assistant to the Commissioner, Harris was Assistant Chief Engineer and earlier Maintenance Engineer, with a long and rounded experience dating from 1924 in the Department.



Howard H. Harris

### Chandler Retires from ASCE Post

E. Lawrence ("Tink") Chandler has retired as Assistant Secretary of the American Society of Civil Engineers. He will continue as Treasurer of ASCE.

At the same time, the Society announced that the Board of Direction has selected Mr. Chandler as the first recipient of the recently established ASCE Professional Recognition Award. It is given an ASCE member judged to have contributed substantially to the status of the engineering profession.

Mr. Chandler has been on the ASCE staff since 1944, serving as assistant secretary since 1948. Previously he was the Society's representative in Washington, D. C.

KARL L. ROTHERMUND, Jr., has been appointed Executive Secretary of the Ohio Contractors Association, Columbus. He succeeds the late Chas. E. McKee.

## ESSICK VIBRATING COMPACTORS



ESSICK VR 72 ON FREEWAY INTERCHANGE

### BACKFILL COMPACTION COSTS CUT IN HALF

"On part of this job involving a tremendous backfilling project of more than a dozen bridges, I would estimate," says Jack Yount, "that by using the VR-72 we doubled our production and cut our compaction costs by at least one-half."

### TOUGH FILL EASILY REACHES DENSITY IN 1 TO 3 PASSES

Jack Yount, Vice-president and General Manager of Vinnell Constructors states: "We really had a problem when we started compaction operations on the interchange of the new Golden State and San Bernardino freeways. The fill soil was composed of oil shale, a lightweight, light colored shale and black organic material, and in addition, moisture content was 10-15% over optimum. After many passes and long hours of rework, a Sheepsfoot roller reached density requirements calling for 90% on a modified AASHTO test.

"We had successfully used our company-owned Essick VR-54-T compactors in the past, but for this particular fill we chose their larger model VR-72-T. Used in conjunction with the Sheepsfoot Roller (to break up the clods), the Essick 72" vibrator brought the solid density to well above California State Requirements in from 1 to 3 passes.

*There is an Essick Vibrating Compactor especially designed to solve your particular compaction problems. The contractor who must achieve higher densities, meet rigid compaction costs and still make every equipment dollar count, relies on ESSICK.*

9 models of Vibrating Compactors from 1 1/2" to 72" widths



for compacting all types of fill, sub base, base materials, asphalt, and trenches

ALSO 14 MODELS OF TANDEM ROLLERS FROM 1 1/2 TO 14 TONS

### ESSICK MANUFACTURING COMPANY

1950 Santa Fe Avenue  
Los Angeles 21, California

850 Woodruff Lane  
Elizabeth, New Jersey

Affiliated with THE T. L. SMITH CO., Milwaukee, Wisconsin

# Summer...

*now is the time to properly  
light your construction hazards*

**It's Summer... more  
highway projects...  
more traffic, too!**

Whatever the season, where-  
ever the road... it's always  
the right time to adequately  
light your highway hazards.  
Protect the public and you  
protect yourself.

## **NEW! DIETZ HAZARD WARNING PLANNER**

**A Practical On-the-Job Tool!** Quickly and  
easily shows how, when, and where to use  
each type of warning light for maximum  
safety under all weather conditions and  
all types of roads and speeds.



**Send \$1.**

for each Planner —  
personalized with your name

**R. E. DIETZ COMPANY**

Dept. 86 225 Wilkinson St., Syracuse 1, N.Y.

**USE THE**

**DIETZ**

**3**

**WAY**

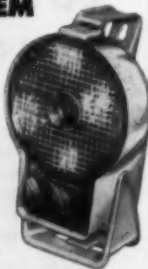
**HAZARD WARNING  
SYSTEM**



**LANTERNS**



**TORCHES**



**VISI-FLASH**

Use Dietz Visi-Flash Lights to alert the on-  
coming driver. Brightest, safest, most  
trouble-free flashers on the market. Warn:  
"Danger Ahead" for up to 1500 hours  
without changing batteries.

Use Dietz Lanterns to locate hazard in re-  
lation to driver's position. Show exact lo-  
cation, shape, extent, and boundaries of  
hazard area. Burn up to 100 hours.

Use Dietz Torches to guide driver around the  
hazard. Fully illuminate the danger in  
every weather. Burn up to 48 hours on  
low cost kerosene.

**Go DIETZ**

*and you go Safely*

## **Publications**

### **Metric Conversion Tables**

Engineers and construction ex-  
ecutives who need to convert metric  
figures to U. S. and British units or  
vice versa, will find invaluable help  
in a new 48-page handbook of  
metric conversion tables.

This pocket-size reference with  
tables on temperature, volume,  
weight, liquid, volume, pressure,  
heat units, units of length, etc. is  
available at \$2.56 within the U. S.  
or \$2.75 to an address outside of the  
U. S. payable in U.S. currency. Ad-  
dress: European Technical Cover-  
age, Inc., 75 East Wacker Drive,  
Chicago 1, Ill. U.S.A.

### **New ASTM Standards for Bituminous Materials**

Compilation of ASTM Standards  
on Bituminous Materials for High-  
way Construction, Waterproofing,  
and Roofing D-4, D-8; 488 pages,  
paper cover; price \$4.75 (\$3.80 to  
ASTM members). Includes 115  
standard specifications, methods of  
test, recommended procedures, and  
definitions. Of these 31 are new,  
revised or have had their status  
changed since the previous edition  
in 1957.

Available on remittance to  
American Society for Testing Ma-  
terials, 1916 Race Street, Philadel-  
phia 3, Pa.

### **Welding Handbook Section III Available**

Publication of the 3rd Section of  
the Fourth Edition of the *Welding  
Handbook* is announced by the  
American Welding Society. The  
cloth-bound 512-page volume con-  
tains 335 illustrations, 78 tables,  
and a comprehensive index. Special  
welding and metal joining pro-  
cesses are covered, as well as arc cut-  
ting processes.

Section III contains chapters on  
the following subjects: Forge weld-  
ing, thermit welding, induction  
welding, surfacing, metallizing,  
brazing, soldering, welding of plas-  
tics, adhesive bonding of metals,

*Continued on page 33*

... for more details circle 299 on enclosed return postal card





When this photograph was taken, 8,000 yards of right-of-way had been cleared of trees, and the roadbed was being prepared for surfacing.

## "Sinclair Helped Cut Maintenance Costs On Every Mile of Our Northway Section"

says J. Hanna, Superintendent,  
D. A. Collins Construction Company

The Northway, another link in the nation's grid of superhighways, connects the New York State Thruway with the Canadian border. Mr. Hanna says, "Our heavy-duty equipment took the toughest kind of punishment on this project. Work ranged from ripping out trees to building bridges. Yet our maintenance costs were far below what we anticipated. Much of the credit must go to Sinclair's service and their high quality fuels and lubricants. They kept our equipment operating at peak efficiency . . . *on schedule*. These are reasons enough why we use Sinclair Products exclusively."

If you haven't discovered the cost-cutting possibilities of Sinclair services and products, see your local Sinclair Supplier — or write Sinclair Refining Company, Contractor Sales Dept., 600 Fifth Avenue, New York 20, N. Y.

# Sinclair

## Fuels and Lubricants



Mr. Hanna reports, "The portable trailer tanks Sinclair loaned to us contributed greatly to the speed and efficiency on our section. We were able to refuel on the job . . . fast, and keep our equipment working full time."

. . . for more details circle 354 on enclosed return postal card



## Where heavyweights move job records prove... **FIRESTONE IS HAUL-ROAD CHAMPION!**

Switch to Firestones and hold downtime to a contract-meeting minimum. You can do this because Firestone off-the-highway tires are job-engineered for the toughest projects. There's a Firestone for every need on any project—and every one is built with Firestone Rubber-X, the longest-wearing rubber ever used in Firestone tires. Exclusive Firestone SHOCK-FORTIFIED nylon cord bodies guard against impact damage. And what's more, Firestone's Giant Tire Service backs up every Firestone tire—that means a Firestone Tire Expert will handle all your tire maintenance problems! Turn downtime into worktime—call your Firestone Dealer or Store today.

**ALWAYS SPECIFY FIRESTONE TIRES WHEN ORDERING NEW EQUIPMENT**

# Firestone

**BETTER RUBBER FROM START TO FINISH**

... for more details circle 303 on enclosed return postal card

32



Super Rock Grip  
Wide Base\*      Super Rock Grip  
Deep Tread\*

**TUBELESS OR TUBED**

Copyright 1960, The Firestone Tire & Rubber Co.  
\*Firestone T.M.

**ROADS AND STREETS, June, 1960**

# New Publications

*Continued from page 30*

oxygen cutting—auxiliary oxygen cutting processes, arc cutting, ultrasonic welding, welding by cold working, and stud welding.

A descriptive leaflet is available free of charge, and copies of Section III may be obtained from the American Welding Society, 33 West 39th Street, New York 18, New York, at a list price of \$9.00 per volume.

## Consulting Engineer On Federal Projects

A survey report entitled "The Role of the Consulting Engineer in Federal Public Works Projects" is now available from the National Society of Professional Engineers, 2029 K Street, N. W., Washington 6, D. C. The report, prepared by the National Society's Functional Section for Consulting Engineers in Private Practice, surveyed 1,464

engineering service contracts with 17 different government agencies and bureaus.

The report shows that average fees charged by private engineering consultants on government projects are considerably lower than widely publicized cost figures. On total construction costs of \$4,325,010,612, the report lists engineering design contract fees as totaling \$127,694,354, resulting in a computed average per cent for design of 2.95.

Copies of the 144-page report may be obtained from the Society for \$3 each. (\$1.50 to National Society members)

## Asphalt Technologists Proceedings Available

The Proceedings of the Association of Asphalt Paving Technologists for 1959 are now available in book form. The volume contains 17 papers covering such subjects as

paving asphalts, aggregate gradations, fillers, stability, density, pavement failures, fatigue tests, chemical composition of asphalts, mixing efficiency, durability, and inter-related effects on the rheological characteristics of asphalts.

The Proceedings can be obtained by addressing Mr. Ward Parr, Secretary-Treasurer, Association of Asphalt Paving Technologists, 1224 East Engineering Building, Box 619, Ann Arbor, Michigan. The price post paid is \$6.50.

## ARBA Bulletin Describes Wire Mesh Replacement

"Machine Placement of Wire Mesh Reinforcement in Single-Lift Concrete Pavement", by Glenn S. Paxson, assistant state highway engineer, Oregon state highway department, has been published by the American Road Builders' As-

*Continued on page 36*

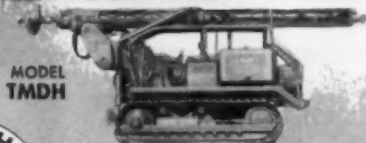
## A WILLIAMS DIGGER FOR EVERY PURPOSE!



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Available in twelve models and a wide range of hole diameters from 12 to 96 inches and depths to 110 feet. Whether truck, tractor or specially-mounted the Williams Diggers will serve any purpose and, in this respect, are virtually custom rigs for the earth-boring contractor. Williams Diggers are unexcelled for sinking holes for everything from electric line poles to architectural foundation piers.



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## Crushes old concrete to aggregate subbase

"We crush old concrete into 2½-in. aggregate for a subbase on asphalt and stone parking areas. Our portable Lima Austin-Western 2036 primary jaw crusher turns out a high daily tonnage with an absolute minimum of maintenance. We also have a Lima A-W apron feeder on another plant. The feeder has doubled production.

"Based on our experience with the crusher, feeder, and an Austin-Western grader, I'd say that the

Baldwin-Lima-Hamilton Corporation turns out quality products which hold up longer and do better jobs than most competitive equipment."—George H. Souther, Gargaro & Souther, Inc., Detroit.

Lima Austin-Western offers a complete line of top quality crushing, screening and washing equipment. The finest materials, skilled workmanship, simplicity of design, and engineering experience are reflected in performance records. Depend on Lima Austin-

Westerns for accurately sized gravel in quantity and years of trouble-free service. Choice of compact, self-contained portable units or custom-engineered stationary installations. Both types assure you high-speed operation and lower tonnage costs. Ask a Lima A-W owner. See your nearest Lima Austin-Western distributor for facts and figures. Or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

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## NEW COMPACT ALLIED-STROUD APPLICATOR



Allied JET SEAL is the Original two-component, polysulfide, polymer-type, joint sealing compound. The Allied-Stroud Applicators (Models X691-E and 8591-D) are manufactured by Allied-Stroud Corp., a division of Allied Materials Corp. This is the only equipment authorized for the application of Allied JET SEAL (Products 9015H and 9015M).

For complete information about Allied JET SEAL and the Allied-Stroud Applicators, write to:

### IDEAL FOR CURB JOINTS—TIGHT SPOTS

With the COMPACT Applicator, curb joints (above), wing-walls—any tedious sealing problem—is solved. Extreme mobility, light weight, small size save time and manpower on all bridge sealing jobs.

### COMPACT APPLICATOR FEATURES:

- Light weight: 650 lbs. 22 inches wide, 48 inches long. Will turn in the space of its own length. May be transported in a pick-up truck.
- Ideal for sealing vertical and overhead joints—light enough to be hoisted. Can apply 100 lbs. of JET SEAL per hour.
- Incorporates features of large JET SEAL Applicator (MODEL 8591-D).

### JET SEAL (9015H) FEATURES:

- Material has no flow—even at elevated temperatures (200° F). Ideal for sealing vertical and overhead joints.
- Has positive adhesion, cohesion, resilience and ductility at low temperatures (—20° F).
- Will prevent penetration of water into joints. Is highly resistant to highway salts.
- Will prevent incorporation of incompressible materials. Quick curing at all temperatures.

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PLANTS: STROUD, OKLA. • DETROIT, MICH. • LOS ANGELES, CALIF.



## Cleveland J-40 digs shale and rock 3-5 feet deep for highway drainage

**THE JOB:** 20 miles of drainage trenching in both inner and outer shoulders of five miles of dual highway for the relocation of U.S. Route 25 near Middletown, Ohio.

**CONDITIONS:** trench to be cut to grade, 18 inches wide, 3 or 5 feet deep depending on inner or outer shoulder, through very densely compacted shale and rocky material, further densified because much of the grade carried hauling equipment all through a winter, spring and summer.

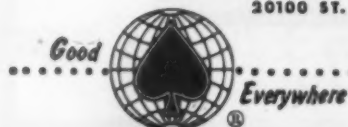
**PERFORMANCE:** despite need to replace worn bucket teeth more frequently than usual because of the tough digging, the Cleveland J-40 dug the trench to accurate grade at the rate of 1,800 to 2,000 feet per 9 hour day.

### J-40 FEATURES:

- Stability—on wide-spaced crawlers, 1000-hour-lubricated
- 100% control of every operation at the operator's seat
- V conveyor for faster, higher, more efficient spoil discharge
- Pulley-enclosed dual, independent, conveyor drive
- Automatic conveyor shifting from side to side
- Over 30 non-slipping digging speeds
- Digs trench 17½ to 30 inches wide, down to 5½ feet deep.

**The CLEVELAND TRENCHER Co.**

20100 ST. CLAIR AVE. • CLEVELAND 17, OHIO



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## Publications

*Continued from page 33*

sociation as Technical Bulletin No. 246.

The author notes that the Bulletin could have been titled "How a Clever Contractor Solved His Problem," since it describes innovations developed by contractor Roy L. Houck of Salem, Oregon, for the economical and efficient placement of welded wire fabric, including the development of special machinery.

The Bulletin may be ordered from ARBA, World Center Building, Washington 6, D.C., at 50¢ per copy. ARBA members are entitled, upon request, to a free copy.

## Contract Form

A newly revised edition of the "Suggested Form of Contract for Use in Connection with Engineering Construction Projects" is now available. This 1960 edition, prepared jointly by the Associated General Contractors of America and by the American Society of Civil Engineers, includes the following new sections:

Changed Conditions, Extension of Time, Responsibility for Work, Partial Completion and Acceptance, Damage Claims, and Acceptance and Final Payment.

There are substantial revisions in the sections on Progress Payments, and Contractor's Liability Insurance. Several outmoded sections were dropped.

Most federal agencies already have established standard forms of contracts in close agreement with the document's provisions. The publication also will be useful to consulting engineers and to state, county, municipal, and other awarding agency personnel who are not now using contract forms employing the most up-to-date and currently accepted practices and provisions.

The new cover design carries the seal of the AGC or the ASCE. Copies may be obtained for 25c each from either organization. The AGC address is 1957 E Street, N.W., Washington 6, D.C.; the ASCE, 33 West 39th St., New York, N.Y.

*Continued on page 42*

"ReoMatics save 6½¢ per mile for Arizona Sand & Rock," reports Ralph Greer, Equipment Superintendent.



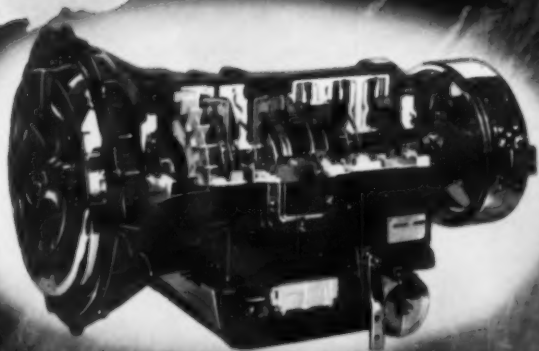
On a fleet-wide basis with each unit averaging 20,000 miles per year, Arizona Sand & Rock pares its operating costs by 6½¢ per mile through the use of automatics over straight sticks. ASR's Reo dumps and mixers are equipped with Reo Gold Comet Engines and ReoMatic transmissions. Prime reason for ASR's standardization on automatics is to relieve costly shock load damage to drive lines and speed up delivery service to customers.

REO DIVISION, The White Motor Company, Lansing, Michigan.



*Gold Standard of Values*

# REO



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## Every Engine in the Line Wet Sleeve Constructed

The engine is the heart of the truck, and no truck can be better than its engine. Horsepower, type of fuel, ease and cost of maintenance, performing ability and suitability are important factors to every trucker's profits.

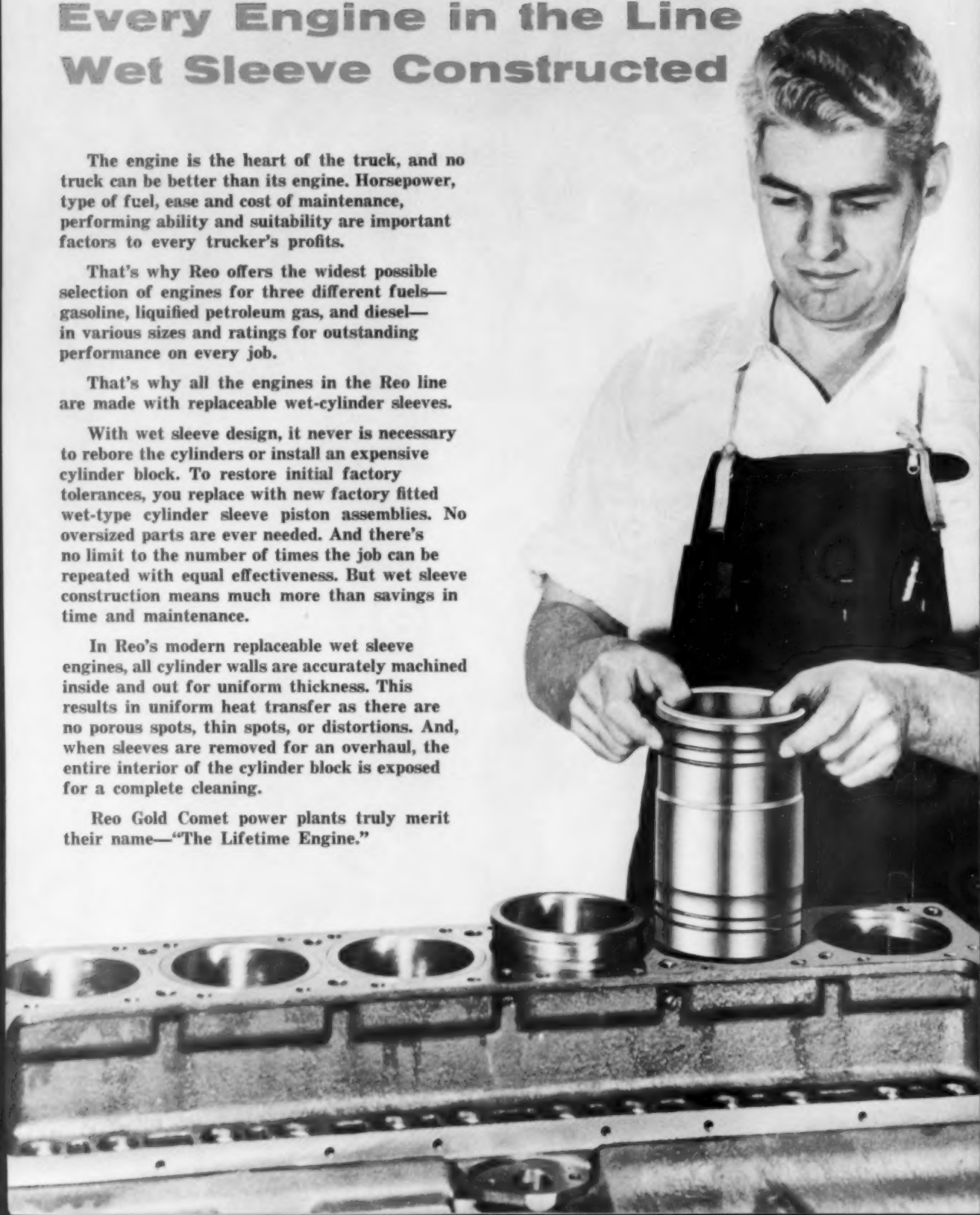
That's why Reo offers the widest possible selection of engines for three different fuels—gasoline, liquified petroleum gas, and diesel—in various sizes and ratings for outstanding performance on every job.

That's why all the engines in the Reo line are made with replaceable wet-cylinder sleeves.

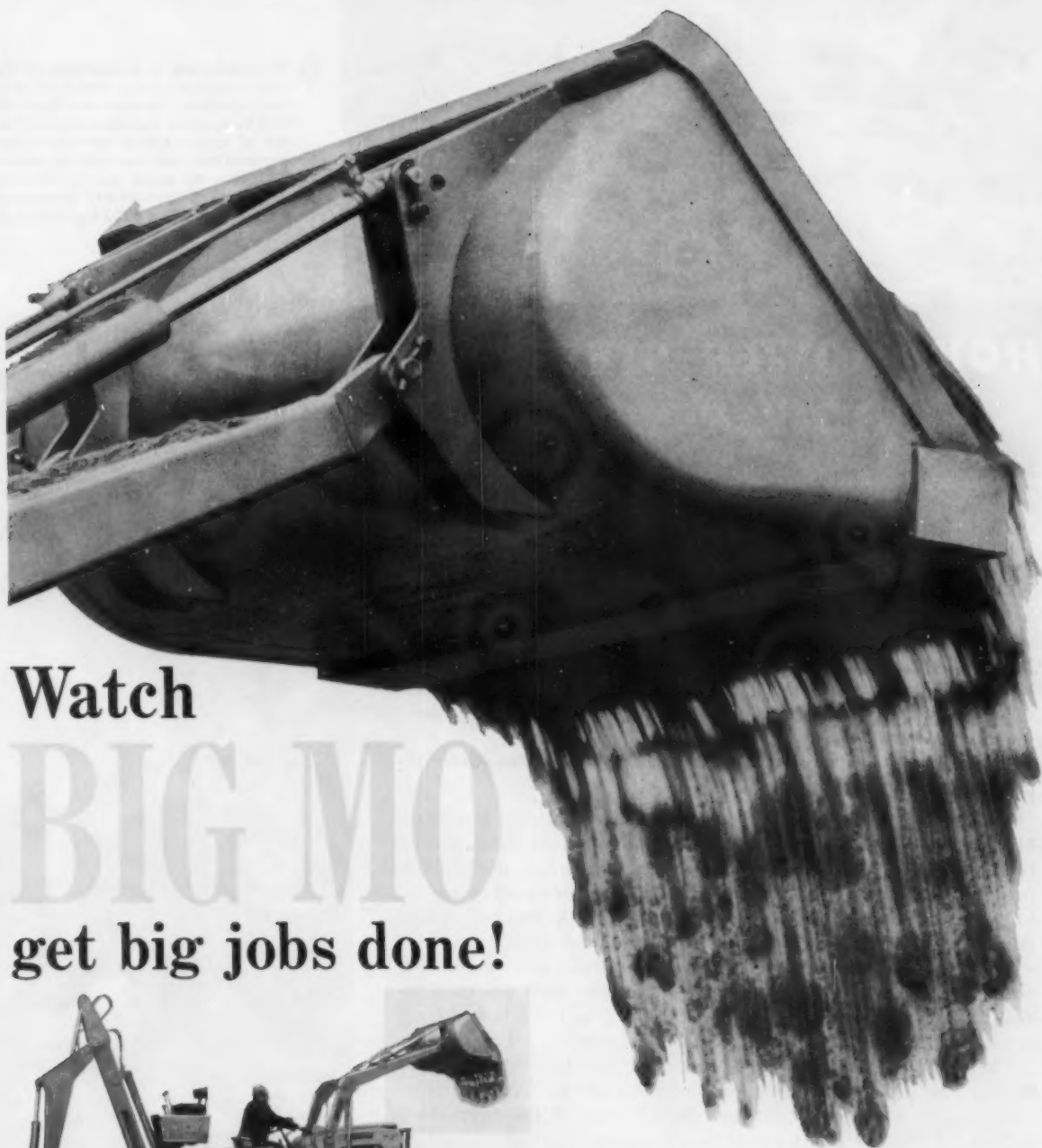
With wet sleeve design, it never is necessary to rebore the cylinders or install an expensive cylinder block. To restore initial factory tolerances, you replace with new factory fitted wet-type cylinder sleeve piston assemblies. No oversized parts are ever needed. And there's no limit to the number of times the job can be repeated with equal effectiveness. But wet sleeve construction means much more than savings in time and maintenance.

In Reo's modern replaceable wet sleeve engines, all cylinder walls are accurately machined inside and out for uniform thickness. This results in uniform heat transfer as there are no porous spots, thin spots, or distortions. And, when sleeves are removed for an overhaul, the entire interior of the cylinder block is exposed for a complete cleaning.

Reo Gold Comet power plants truly merit their name—"The Lifetime Engine."







# Watch BIG MO get big jobs done!



Big-muscled and big-mouthed, with an appetite that just won't quit. That's Big MO.

Take the no-clutching shuttle reverse, for example. Big MO steps right up, takes a big bite under full power, backs away fast and dumps—all with the flip of a lever. Leaves others fumbling with their buttons. More work per hour (and more profits)—that's Big MO's specialty.

And on Big MO's other end is the workin'est backhoe you ever saw. It digs in 12 ft. 6 in. at any point in a 190° swing. With 7000 pounds of digging force. Digs

straight sides and square corners. And the offset seat pivots with the boom so the operator can see what Big MO is doing at all times.

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## HOW POWER-STEERED, POWER-SHIFTED . . .

### —on California mining operation

Even before all the blast dust has settled, this International TD-25 is slamming tons of shot-rock from the benches, so trucks can resume hauling to the processing plant. Then, at this gypsum mine in California, the "25" takes over the "shovel-feeding" chore—dozing full blades of rock upgrade, downgrade, and 'round the curves, to help keep the big dippers swinging full. And in between times, the "25" takes over its third tough project: benching new haul road around mountain slopes!

*Three slam-bang rock operations to handle—it's a made-to-order situation for the Planet Power-steered TD-25!*

**"Dead-track drag" eliminated!** You don't brake a track and "half-kill" your pull-power to turn, as you do with king-sized clutch-steered crawlers. With Planet Power-steering you simply change the speed of one TD-25 track—on-the-go, and with 2-finger ease! Around comes the fully-loaded TD-25—with "live" power on both tracks and both tracks pulling. Load-limiting "dead-track drag" is eliminated!

And combined, on-the-go Hi-Lo power-shifting lets you match power to load, instantly—forward or reverse. Just shift one track to high range—the other to low—to do slope-hugging, full-bite benching, or to operate straight ahead with off-center loads!

The "25" is platformed on new 7-roller tracks with double-box-beam frames. The design provides super undercarriage strength for slam-bang conditions—strength to match the full effort of the direct-start, high-torque DT-817 International Diesel engine.

**Power-steer and power-shift the TD-25** with king-sized loads. Measure the bonus capacity you get with exclusive Planet Power-steering and Hi-Lo power-shifting. See how this control combination enables you to outearn other big rigs up to 50%. Then measure what it means to get this double-barreled advantage *only* in the TD-25—and as standard equipment to *boot!* Let your International Construction Equipment Distributor demonstrate.

International Harvester Co.  
180 North Michigan Ave.  
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A COMPLETE  
POWER PACKAGE



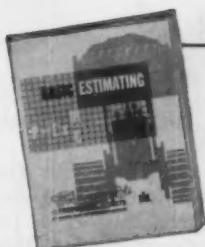
**International  
Construction  
Equipment**

◊ Even moving a blade-full of shot-rock around the curve, there's no hesitation, no sluing to spill the load. The TD-25's operator has separate speed control of each track to get full-capacity performance, full time. And only the new TD-25 has the power plus of the direct-start, turbocharged DT-817 International engine—that delivers 230 high-torque hpl

## TD-25 takes



**"Boulder-doing" after blasting—**  
The TD-25 does some "blasting" itself to move "big-as-a-house" hunks of rock aside. Heavy-duty TD-25 Dura-Rollers defy the rock-doing "grind"—with the industry's thickest shells to prevent flexing—positive grit exclusion—and 1,000-hr.-interval lube capacity!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!

## over three slam-bang rock jobs



# New Publications

Continued from page 36

## Bituminous Paving Materials (STP 252)

A compendium of symposium on methods of test for design of bituminous paving mixtures; symposium on practical and statistical significance of tests and properties of bituminous binders; session on road paving materials. 238 pages, hard cover, 6 x 9". Price \$5.50. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

Reflecting the increasing emphasis on better pavement construction, this volume is invaluable to the highway and runway engineers who need to know more about factors entering into the design of more durable pavements; and of the application of existing methods of test to design and construction of bituminous paving mixtures, as well

as the development of new tests. Contents are:

Symposium on Methods of Test for Design of Bituminous Paving Mixtures. General Factors in Design of Bituminous Paving Mixtures (L. F. Rader); Theory and Application of a Gyrotory Testing Machine for Hot-Mix Bituminous Pavement (John L. McRae and Charles R. Foster); Application of the Marshall Method to Hot-Mix Design (H. L. Lehmann and Verdi Adam); Control of Bituminous Shoulder Construction for the Northern Illinois Toll Highway (Joseph J. Waddell); Triaxial Testing of Bituminous Mixtures (W. H. Goetz and J. H. Schaub); Correlation of Hveem Stabilometer and Cohesimeter Test Results and Kneading Compactor Densities with Service Records of Bituminous Pavements (C. E. Minor); Void Requirements for Dense-Graded Bituminous Paving Mixtures (N. W.

McLeod); Use of the Immersion-Compression Test in Evaluating and Designing Bituminous Paving Mixtures (Joseph F. Goode).

Symposium on Practical and Statistical Significance of Tests and Properties of Bituminous Binders. Introduction (D. F. Fink); The Evolution of ASTM Tests and Specifications for Asphalt Paving Materials (Gene Abson); Practical Significance of Tests on Asphalt Cements (N. W. McLeod); Precision of Present ASTM Tests on Bitumens and Bituminous Materials (A. B. Brown); Fundamental Statistical Concepts in Testing (P. E. Irick); Summary—Possibilities for Extension and Improvement of ASTM Tests on Bituminous Paving Binders (D. F. Fink).

Papers on Road and Paving Materials. Fundamental Viscosity Versus Saybolt Furol Refinery Control

Continued on page 46

## Negative thinking can cost you 50% more

**Don't Scrap Giant Tires When Retreads Do the job at half the Cost**

Giant size savings plus new tire mileage are yours when you specify Southern Tire's expert retreading service.

No need to worry over costly downtime, either. Southern Tire trucks pick up your tires after hours and return them quickly to service.

A wide selection of treads include Rock Service • Traction Types • Rib Treads.

All sizes from 1100 x 24 to 33.5 x 33.

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# UP And RUNNING In 16 Hours..

## Automaster-CA Paving Plant

Here's a one-stop paving plant that starts batching profit in as little as 16 hours after components arrive. All parts of the plant package are pre-assembled into easy handling, compact units that meet road limits for truck transport. Maximum lift is about 7½ tons.

## What About Batching?

The Automaster-CA weighs out a 1½-cu. yd. paver batch every 15 seconds! Plant has three 38 cu. ft. (3000-lb. scale) aggregate batchers, one 14 cu. ft. (1000-lb. scale) cement batcher. All are air-ram operated, fully automatic — have centralized controls, electric interlocks, and beam boxes with balance indicators.

To meet U. S. Engineer specifications, batching equipment can be furnished with dial scales, 12-mix selector system, graphic pen recording, time and date stamp, interlocks, and aggregate moisture compensating beams. Ask your Johnson distributor for details.

... portable, stack-up design speeds assembly



Batchers, dial scales and control console are combined into one compact unit — install in one lift. Plug-in control connections eliminate complex field wiring.



Divided material bin stacks above batchers. Holds 100 cu. yds. aggregate (150 tons @ 3000 lbs. per yd.) — 143 bbls. cement (@ 4 cu. ft. per bbl.)



Next, cement elevator complete with head platform, access ladder, and safety cage goes up. Chain and bucket-line capacity: 440-bbl.-per-hour.



Lower undertrack screw conveyor into place, add silo, and bring on the trucks! Silo with aeration system, high-low-level signals, etc. Holds 447 bbl.



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CHAMPAIGN, ILL., STOCKTON, CALIF.

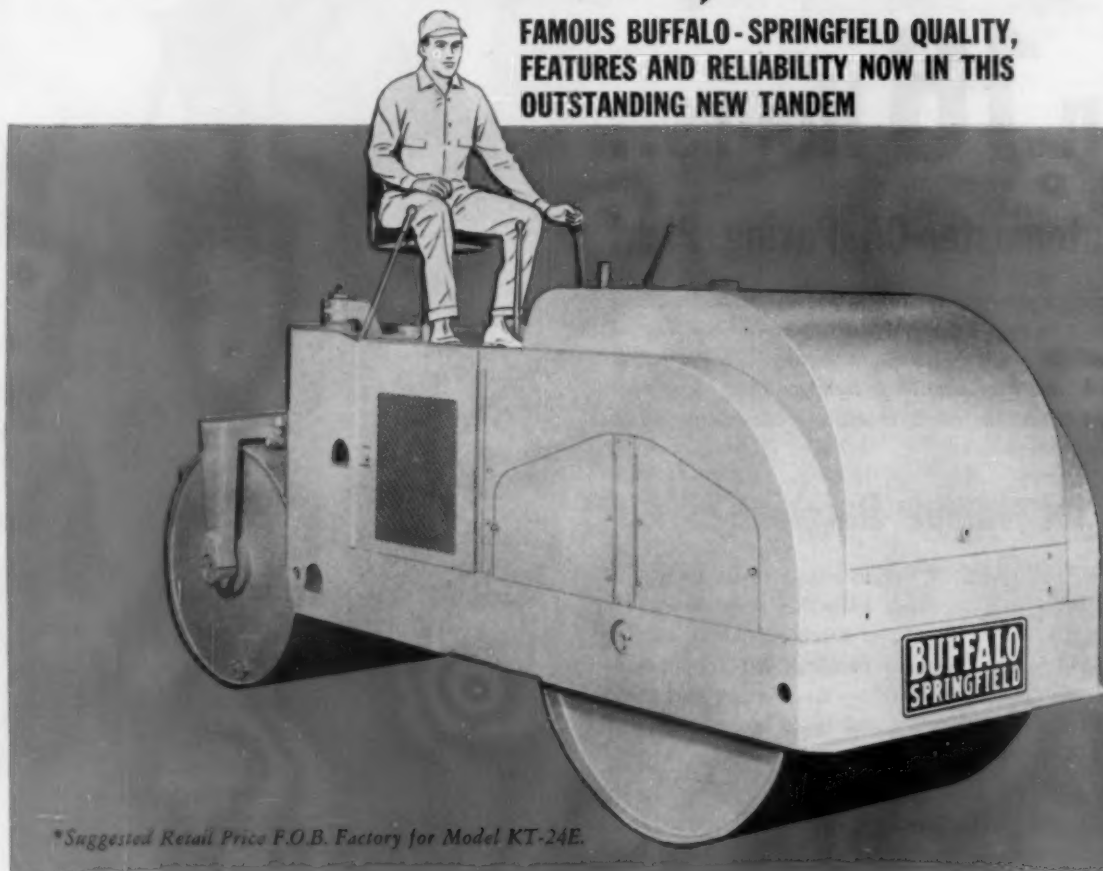
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New Low Price

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**FAMOUS BUFFALO-SPRINGFIELD QUALITY,  
FEATURES AND RELIABILITY NOW IN THIS  
OUTSTANDING NEW TANDEM**



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## **MODELS**

**KT - 24 E**

**(8-12) TON**

**KT - 25 E**

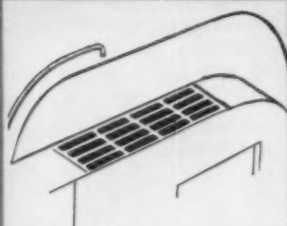
**(10-14) TON**

You asked for these new DELUXE Tandem Rollers that combine the job-tested and proved better QUALITY features of the Heavy-Duty Tandem with the ECONOMY of the Standard-Duty model. Now in one great machine you can be sure you'll get more value for every dollar invested than in any roller equipment ever offered before. The cost is slightly higher than some "make-do" rollers on today's market, but each dollar invested in this outstanding Tandem will pay you dividends in lower maintenance, longer life, better performance and top job speed. Talk first to your Buffalo-Springfield distributor. You'll be money ahead!

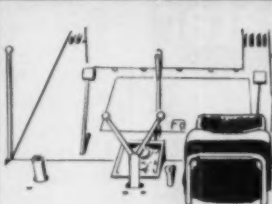
# NEW 8-12 TON

## DeLuxe Tandem

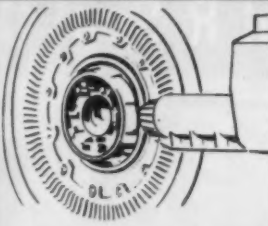
Check these BIG Value Features



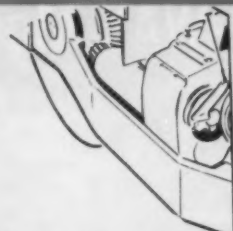
**FULL-WORKING VISIBILITY . .**  
Open grille on both sides over drive roll enables operator to see roll edge at all times.



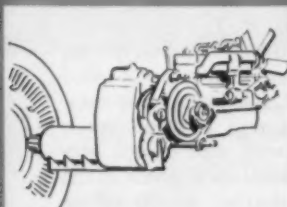
**CONVENIENT DUAL CONTROL . .**  
Full operation from either side of machine provides optimum visibility in operation. Speeds up work.



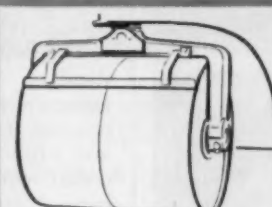
**ADJUSTABLE BEVEL GEAR FINAL DRIVE . .** Easily adjusted to maintain positive drive at all times. Reduces maintenance costs.



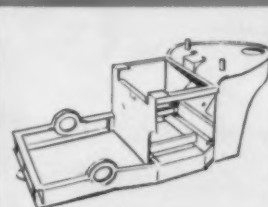
**FULLY-ENCLOSED, ARMORED FRAME . .** Complete protection for final drive plus high ground clearance for closer rolling.



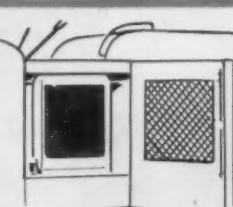
**SINGLE-UNIT POWER TRAIN ASSEMBLY . .** Your assurance of precise alignment of all components for lasting, trouble-free performance.



**HYDRAULIC POWER STEERING . .** Low pressure system permits most accurate control for smooth, close rolling with minimum operator fatigue.



**RIGID CONSTRUCTION . .** Maximum strength, longer operating life and greater rigidity to keep you fully satisfied with your new DELUXE.



**SIDE AIR INTAKE . .** An important feature that greatly reduces danger of clogging and gives you easier access to radiator.

**PLUS . .** LONG-LIFE TAPERED ROLLER BEARINGS so each roller moves smoothly, freely for longer wear, easier action . . SPECIAL MANGANESE ALLOY MACHINED ROLLS for maximum toughness, longest wear . . HIGH-SPEED, LOW-TORQUE REVERS-

ING CLUTCHES for smoothest reversing without grabbing, longest clutch life . . TROUBLE-FREE, RUST-PROOF SPRINKLER SYSTEM uses brass pipes, copper tubing and large capacity tank with filter. SEND FOR FULL INFORMATION.



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Models KT24E and KT25E Tandem Rollers

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# New Publications

Continued from page 42

of Cut-back Asphalt (D. F. Levy, F. E. Fassnacht, R. D. Umbach, G. P. Hibler, and D. W. Gagle); Density Changes in Asphalt Pavement Core Samples (T. C. Hein and R. J. Schmidt).

**BITUMINOUS PAVING MATERIALS.** Includes a symposium on methods of test for design of bituminous

paving mixtures; also a series on practical and statistical significance of tests and properties of bituminous binder, and papers from a convention session on road and paving materials.

This 232-page cloth bound volume represents a compilation on the above subjects as presented at the 62nd annual meeting of the

ASTM in June 1959. Price \$5.50 (\$4.40 to members). American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

**PAPERS ON ROAD AND PAVING MATERIALS, STP 212.** 82 pages, hard cover; price \$2.75 or \$2.00 to ASTM Members. Available on request to American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

**STUDIES OF HIGHWAY DEVELOPMENT AND GEOGRAPHICAL CHANGE.** By William L. Garrison, Brian J. L. Berry, Duane F. Marble, John D. Nystuen, and Richard L. Morrill. 310-pages, illustrated. Price \$7.50. University of Washington Press, Seattle 5, Wash.

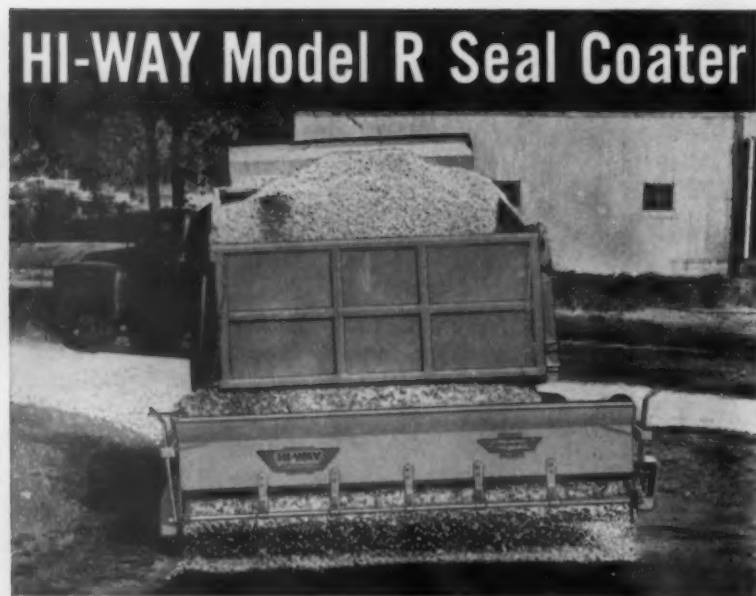
**SIMPLIFIED DESIGN OF REINFORCED CONCRETE.** By Harry Parker. 300 pages. Price \$6.50. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y.

This 2nd edition of a well known standard introductory text and home-study book includes numerous new features. It recommends and stresses unit and design procedure requirements as given in the current publication of "Building Code Requirements for Reinforced Concrete, ACI 318, of the American Concrete Institute.

**WELDED INTERSTATE HIGHWAY BRIDGES.** Edited by James G. Clark, partner of Clark, Daily & Dietz, consulting engineers. Price \$2.00 in U. S. A., \$2.50 elsewhere. Published by James F. Lincoln and Arc Welding Foundation, Cleveland 17, Ohio. A compilation of the award winning designs of the Foundations 1958 Award Program on welded interstate bridges for the Interstate defense highway system.

**FREQUENCIES OF VARIOUS LEVELS OF STRESS IN HIGHWAY BRIDGES.** By Henson K. Stephenson, Research Engineer. Available in Reprint No. 6, Texas Transportation Institute, Texas A. & M. College System, College Station, Texas.

Continued on page 48



## Handles all Aggregate from Sand to Crushed Rock. Priced to Make Even Small Jobs Profitable!

There's a HI-WAY Model R to handle your seal coating job—from narrow 8' drives and close-in work to 13' roadways, using all aggregates from sand to crushed rock. A swivel type, self-coupling hitch permits fast hook-ups or disconnections with any truck. Requires no installation of cab controls. Smooth, uniform spreads are assured by a large 5 1/4" dia. feed roller with right and left cut spirals. Block-off plates, one 1-ft. and one 2-ft., are easily inserted for precise width of spread. Top notch workmanship and material assures minimum maintenance.

### Other Model R Features

- Available in 6 widths from 8 to 13' with capacities up to 1.6 cu. yd.
- Forward and reverse transmission controlled by a single lever.
- Adjustable feedgate levers at both ends of spreader permit tapered spreads
- Feedgate follows true arc—doesn't lift against weight of material in hopper. No free flowing

Write for the latest literature and complete specifications.

**HIGHWAY EQUIPMENT COMPANY**

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# **"CLASH-BOX"** *robbing your CASH-BOX?*

*Crawlers without  
full-power shift  
are obsolete . . .  
and costly!*

If your crawlers have master clutches and manual shift transmissions—"clash-boxes" as they're commonly called—you may be passing up profits that should be yours.

With proven Torqmatic Drive in the Model C-6 and the TC-12, Euclid Crawlers provide full-power shift and instant reverse. There's no loss of power or momentum when changing from one speed range to another . . . no delay for clutching and shifting . . . and with a flick of the wrist you change travel direction fast. It's a dependable power train, too . . . proved in thousands of "Euc" earthmovers on every kind of job.

Have your dealer show you how Euclid Crawlers have more productive capacity on any tractor work . . . dozing, ripping, push loading big scrapers, or towing heavy loads. The seconds they save on every work cycle can add up to more cash in your cash box!

**EUCLID** Division of General Motors, Cleveland 17, Ohio  
Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland.



Proven Torqmatic Drive provides smooth steady flow of power . . . full-power shift . . . instant reverse . . . easy operation. For push loading scrapers the fast maneuverability of "Euc" crawlers cuts scraper cycle time and steps up production . . . changes from one speed range to another, and from forward to reverse and back again, are made under full power . . . there's no clutching.



## **EUCLID EQUIPMENT**

FOR MOVING EARTH, ROCK, COAL AND ORE



## Austin-Western—the economical, all-purpose grader for contractors

"With our Austin-Western Super 200, we can lay stone or blade a finish grade equally well. Because it does so many types of work, it's a real time and money saver. For instance, on a recent highway job, the A-W laid such a fine finish on a cloverleaf slope that we didn't have to touch a shovel to it; not a bit of hand labor necessary!"

"I wish all equipment was as economical and easy to maintain and operate as the A-W. You can bet that when we're ready for another grader we'll consider buying another Austin-Western!"—Joe Rotondi, G. Rotondi & Sons Contractors, Melrose, Mass.

Exclusive all-wheel drive and all-wheel steer, in combination with precision hydraulic controls, make A-W graders such useful, all-around machines for

contractors. Learn for yourself; ask any A-W owner.

Available in 6-wheel Super and 4-wheel Pacer models; wide range of weight classes and horsepower ratings. Get all the facts; see a demonstration. Contact your nearest distributor or write us direct.



**EXTREME BLADE REACH** is one of many operational advantages. Rear steers and blade reaches for perfect finish without tire marks.

## Austin-Western

CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

**BALDWIN · LIMA · HAMILTON**

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

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## Publications

Continued from page 46

**SAFETY MANUAL.** Pocket size book of instructions on the importance of setting up safety programs and facilities on roadbuilding and construction, and on procedures recommended for various injuries. Prepared by the Department of Highways and Transportation of Saskatchewan, with headquarters at Regina, Canada.

**INSURANCE INSTITUTE FOR HIGHWAY SAFETY.** This organization with headquarters at 1710 H Street, N. W., Washington 6, D. C. has published a brochure explaining its purpose. Founded early in 1959 to combat motor vehicle accidents on an industrywide front, it speaks for various associations which represent more than 500 casualty insurance companies. Individuals or agencies desiring to learn of this Institute's activities should write for this free publication.

**EXPERIMENTAL CONTINUOUSLY-REINFORCED CONCRETE PAVEMENTS:** Progress Report, 1959. Bulletin 238, Highway Research Board, 2101 Constitution, Washington, D. C. This 104-page bulletin contains seven papers presented at the Board's 38th Annual Meeting in January 1959.

**HIGHWAY LAWS, 1959.** Bulletin No. 237, Highway Research Board, 2101 Constitution Avenue, Washington, D. C. Price 60 cents. Contains report of the Committee on Highway Laws together with four papers presented at the Board's 38th annual meeting.

**ACCEPTED ACCOUNTING PRINCIPLES FOR CONTRACTORS.** A 31-page publication by the American Institute of Certified Public Accountants, 270 Madison Ave., New York 16, N. Y. Write for details.

## Traffic Safety

### Death Trap Study

Plans to undertake a study of highway death traps in Pennsylvania were announced by Edmund R. Ricker, chief traffic engineer of the state's department of highways.

He said, "We want to pinpoint those areas where we have a high accident rate. By channeling traffic, eliminating view obstructions, and applying other corrective measures, we hope to make the locations safer." Ricker said his engineering bureau would be expanded by some 60 traffic engineers and assistants to conduct the study. They will recommend safety measures to improve conditions at areas where surveys show a high frequency of accidents.

Stress by Governor Lawrence on highway safety as a major program of his administration has given new impetus to safety engineering in the Pennsylvania department. First indications of this emphasis have included use of larger, reflectorized directional signs; painting white lines on the edges of all roads 20 ft. or more in width; and increasing sight standards for passing from 500 ft. up to a new 800 ft.

Also, new specifications have been developed for traffic protection on road construction jobs; and centerline markings are being standardized. With the new type signs already starting to appear on state highways, Ricker said that as each of the estimated 800,000 signs on the 41,700 miles of state-maintained highways wears out or is damaged, it will be replaced by a new one. The department sign shop in Harrisburg is turning out about 50,000 a year. (However, this past spring, the painting projects ran into an indefinite delay because of a court suit by an unsuccessful bidder.)

### New Manual On Traffic Control Devices

State highway department engineers, as well as those in county and city agencies concerned with traffic control, are looking forward



California paving contractor says:

## Liked A-W roller so well, bought two more!

"Our first A-W performed so well that we bought two more over a period of 5 years. We use them to roll both subgrade and finish courses. They are fast and efficient machines; and can deliver the 95% relative compaction required. Torque converter allows more positive control of rollers for uniform compaction. Hydraulic controls make them easy to operate. Plenty of visibility for operators to do precision jobs. The A-W rollers are well-built; maintenance has been no problem."—Pat Regan, Exec. Vice Pres., A. J. Raisch Paving Co., San Jose, Calif.

A-W 3-wheel rollers available in 8 to 11, 10 to 12, 12 to 14-ton models; tan-

dem 5 to 8, 8 to 12, 10 to 14 tons. Portable tandem variable between 3½ to 6 tons. Vibratory Roller Compactor and Widener Attachment also available. Choice of gasoline or diesel power; torque converter with 4-speed transmission optional.

Austin-Western offers you a number of important dollar-saving features not available on many other makes of rollers. Let us prove to you the ways in which A-W rollers can increase your compaction efficiency and decrease maintenance and operating costs. Contact your nearby Austin-Western distributor or write directly to us.

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**TOP**

here's logic in the fact that the pioneer builders of low bed trailers developed the trailer that has set new high standards—in construction—in performance—and its surprisingly low price.

**VALUE**

ersatility in ability to handle a sizable majority of loads that otherwise would require larger, heavier, more costly to operate units especially appeals to all contractors that have purchased this trailer.

**TRAILER**

o make such a constructive contribution to heavy hauling required specialized knowledge gained through years of experience—exceptional manufacturing facilities—and large volume that permits cutting costs “to the bone” and passing the savings along to the purchasers—all Rogers advantages.

You can own a superior ROGERS for as little or less than an ordinary “off brand” trailer.

There's a capacity for you—15, 25 and 35 tons.

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## Traffic Safety

to the publication of a new revision of the basic national manual on such devices.

This is the one being prepared by the National Joint Committee on Uniform Control Devices. This Manual will constitute the “Bible.” The Bureau of Public Roads is expected to insist that the recommendations in the Manual be followed virtually to the letter, in any state manuals being revised or prepared on the subject. The Bureau indicates that it will approve for the federal aid highways only such traffic control devices as will conform to the new revised Manual.

After allowing a reasonable time for the gradual replacement of any existing installations, made obsolete by the new manual, the Bureau will make the new standards mandatory on all highways constructed with federal aid since 1944.

The last edition of the manual was published in 1948, and a limited modification was made in 1954. Hence, the forthcoming new edition is one of extreme importance. It will include for the first time standards for modern expressways such as are embodied in the interstate program, and also for the first time standard signs will be shown for safe traffic control during maintenance and construction operations.

## New Safety Record

The lowest death rate yet recorded due to traffic on the nations' highways was given for the first 8 months of 1959 by the National Safety Council. This agency said that the traffic fatality rate has dropped to 5.1 per 100 million miles of vehicle travel. This shades the 5.2 figure for 1958.

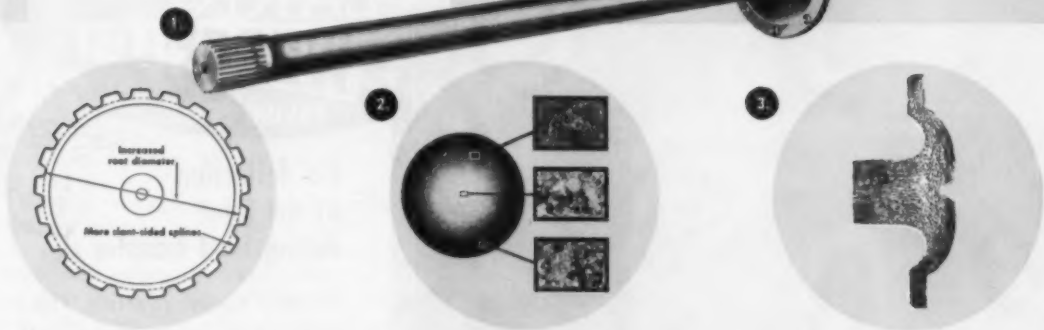
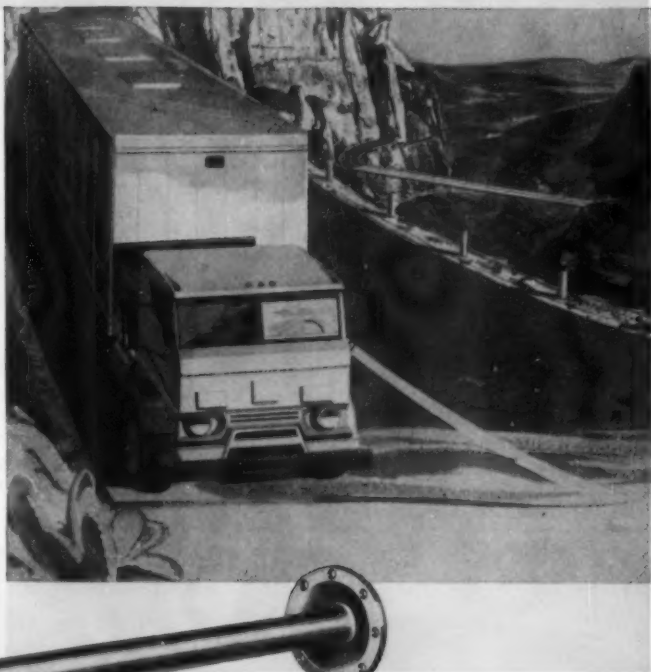
The gross number of deaths however was upward because of the increased travel during this prosperous year. The outlook is for 39,000 total traffic deaths in calendar 1959.



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## ONLY GENUINE TIMKEN-DETROIT® REPLACEMENT PARTS KEEP THEM THAT WAY!

Whether they are made for original equipment or for replacement parts, Timken-Detroit Axle components always meet the same rigid standards of quality, performance and rugged durability. In every Timken-Detroit component, important extras are built in—extras that are not available with any so-called substitutes. For example, only a Torsion-Flow axle shaft replacement gives you all these important *original* equipment advantages:



1. More Slant-Sided Splines decrease individual spline load to prolong shaft life. Root diameter is increased for greater strength. Splines are enveloped by differential side gears to eliminate high stress areas.

2. Patented Heat Treating Process gives the axle shaft an extreme hardness on the outer surface which graduates to a tough, resilient inner core.

3. Torsion Flow Forging. Flange is integrally forged so grain structure of the shaft conforms to the shape of the flange. All torsional stresses are opposed by the grain flow for maximum resistance to cracking.

See your factory authorized vehicle dealer for all your replacement needs.

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Transmission and Axle Division, Detroit 32, Michigan

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## Guardrail Keeps Big Van From Ditching



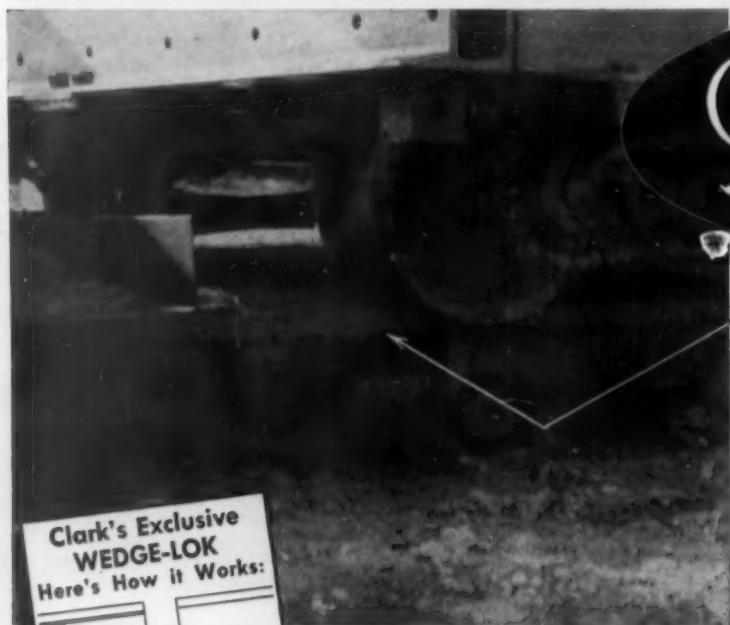
The driver of this truck was barreling along the Southeast Expressway in Boston, when he suddenly realized that his truck tractor had parted company with his trailer. Fortunately a steel guard rail bordered the roadway. The big trailer came to rest against the rail, which prevented it from tipping over and down the embankment. This photograph from Armco Drainage & Metal Products, Inc., highlights the usefulness of guard rail.

## Armco Scholarships

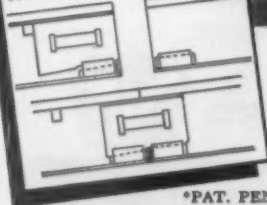
Four-year civil engineering scholarships have been awarded to five high school seniors in a nation-wide scholarship selection program sponsored by the Armco Foundation, in cooperation with the National Society of Professional Engineers.

The \$3,000 scholarships were awarded by a selection committee made up of professional engineers holding Society membership, and representatives of the Armco Drainage & Metal Products, Inc., a subsidiary of the Armco Steel Corporation. The awards were granted on the basis of the students' scholastic records and aptitudes for engineering. This is the second year of the awards.

THE NEW JERSEY state highway department has placed over 400 new litter barrels at strategic locations along the 1,850 mile state highway system. The familiar "No Litter—\$50 Fine" signs form one successful part of the campaign.



Clark's Exclusive  
**WEDGE-LOK**  
Here's How it Works:



\*PAT. PEND.

UNRETouched PHOTO

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INDUSTRIES



construction equipment division

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PAVING FORMS

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at the joint  
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See your local dealer for the  
complete Clark line of con-  
struction equipment.



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**STOCKPILE**—The 125 HiLoader fills a truck in less than a minute...loads the next truck by a smooth swing of its discharge conveyor.

SAVE ON  
LOADING JOBS  
WITH  
THIS

# MULTI-PURPOSE LOADER



**WINDROW**—The 125 HiLoader loads all materials from sod to coarse aggregate at 5-10 cu. yds. per minute.

**STOCKPILE**— Outworks two to three end loaders

**WINDROW**— Loads a truckful a minute

**SNOW**—Replaces a whole crew of men

Bulky, light, wet or chunky materials—same high-speed steady loading. The full-floating feeder of Athey's 125 HiLoader follows the contours of the material and adjusts to its density. Fast uniform loading is sure fire.

There's no more jockeying around and backing up trucks. Pull a truck alongside the Athey 125 and the discharge conveyor hydraulically swings over and loads it—loads one, for instance, while another moves into position. The swiveling conveyor also casts materials right, left, or straight back—an impressive distance of 19'6"! No need to keep moving the Athey 125, full conveyor control does the work—loading is continuous, and fast!

See how the versatile workpower of this machine saves money on multiple jobs in the illustrated 125 booklet. Send for your copy today!



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**125  
HILOADER**

**Athey** PRODUCTS CORPORATION, 5631 WEST 65TH STREET, CHICAGO 38, ILLINOIS

ROADS AND STREETS, June, 1960

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## MAGINNISS SIDE FORM VIBRATORS

*For any hydraulic  
self-widening or telescoping  
concrete Finisher or Spreader*

By using the MAGINNISS hydraulically operated Side Form Vibrator attachment, you will get sound, dense concrete next to side forms—prevent honeycomb—eliminate the need of hand labor—and lower costs on your concrete paving jobs.

The MAGINNISS Vibrator attachment includes two Hi-lectric motor-in-head Vibrators, each spring-mounted on a separate shaft and hanger. As the width of the finisher or spreader is varied, the vibrator units automatically adjust with the change. Depth and angle of both vibrator heads are hydraulically controlled by a single lever.

MAGINNISS motor-in-head Vibrators are fully submerged in and cooled by the concrete. They provide uniform INTERNAL vibration to assure a homogeneous mixture of aggregate and mortar along the forms from base to surface in slabs 2" to 36" thick. These Vibrators can be mounted as much as 15 inches in from the side form and still vibrate concrete effectively enough at the forms to eliminate honeycomb.

There are no cumbersome flexible shafts or external drive motors. MAGINNISS Vibrators are powered by a MAGINNISS 120 volt, 180 cycle gasoline engine driven generator mounted on the spreader or finisher.

Ask your MAGINNISS Distributor for all the facts. You'll find him listed in the Yellow Pages under "Contractors' Equipment" in 85 principal cities.

Find your nearest  
distributor in the  
"Yellow Pages"



Actual photo showing honeycomb left in slab before Maginniss attachment was installed.



Photo of slab on same job showing dense, sound concrete consistently produced by Maginniss Side Form Vibrators.



# MAGINNISS

## POWER TOOL COMPANY

for Literature write Dept. RS-60

154 Distl Avenue

Mansfield, Ohio

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## De-Icing Salt Orders Set Tonnage Record

The nation's state, county and municipal highway departments entered the 1959-60 winter with 2,200,000 tons of de-icing salt already stockpiled or on order for continuing deliveries. The Salt Institute said that this winter's orders are 10 percent higher than last winter's and 30 percent higher than five years ago.

Among the state highway departments that called for bids on higher tonnages of salt this year than last year are the following:

	1958-59 (tons)	1959-60 (tons)
Connecticut ..	30,000	40,000
Indiana .....	50,000-55,000	50-100,000
Michigan ....	45,000	80,000
Maine .....	48,000	60,000
New Hampshire	70,000	110,000
Virginia .....	8,000	9,870
Wisconsin ...	45,000	50,000
Illinois .....	45,000	72,000
Illinois Tollway	5,000	10,000

A 24-page booklet "Salt for Ice and Snow Removal" is available from the Salt Institute. This handbook explains salt's properties as a de-icing chemical and how best to use it. Address Salt Institute, 33 North La Salle Street, Room 3101, Chicago 2, Illinois.

## Melt Ice Faster With Mixtures

Demands of traffic for high speed winter maintenance have made necessary a "new look" at available techniques and procedures, suggests the Calcium Chloride Institute.

Not many years ago, application of abrasives was the only method of combating slippery surfaces. This method had limitations. Abrasives did not stick to the road. They froze in stockpiles. Then calcium chloride was tried, and adopted. It kept abrasives moist and unfrozen in storage. The solution of calcium chloride (which coats the abrasive) melts the ice upon contact.

The need for "bare pavement" maintenance on more heavily traveled highways has led to use of chemical mixtures. Salt was the natural ice melting material to turn to—low in cost, readily available, and

*Continued on page 56*



**HOW**

# Rock-Ribbed Payhauler®

**GIVES YOU**

**new load-  
speeding  
capacity!**



Of all rear-dumps in their size classes, only the International 65 and 95 Payhauler models give you the weight-shedding, strength-multiplying, rock-ribbed corrugated bodies! You trade 2½ tons of power-wasting dead weight for 3 bonus tons of capacity in the new 95 Payhauler!

Only the 65 and 95 Payhauler models have the power "plus" of the direct-start, high-torque, 4-cycle 6-cylinder International "817" Diesel engine! The "95" is powered by the 375-hp DT-817 turbocharged Diesel; the "65" has the same basic, high-output power plant: the naturally-aspirated 250-hp D-817!

Choose the "95" with power-shift torque-converter, or 9-speed air-shift transmission. The "65" comes with 10-speed constant-mesh transmission. Both models have the load-speeding safety of reserve-area braking and "one-hand," road-holding power steering! Above, it's the "65" shown storming up a 16% grade with 19-ton payload. Compare how Payhauler gradeability speeds the cycle over other haulers!

In minimum shovel time you heap-load the big-target Payhauler body. Rugged corrugations absorb rock-shock—give high resistance to wear and distortion from abrasion and impact! Torque-cushioning planetary-type axles let you apply full power to start and haul full loads!

Get 11-second Payhauler dumping with exclusive, action-speeding inverted hoist design! Simple, easy-to-operate up-and-down snubbing control prevents machine-punishing impact! Fast reverse, up to 7.1 mph., speeds spotting to dump or load!

Add up the capacity-boosting advantages of Payhauler power-to-payload punch—super-speedy Payhauler loading, hauling and dumping. See how either the 19-ton "65" or 27-ton "95" can give you gear-faster climb-outs—and haul up to 14% faster than other rear-dumps! See your International Construction Equipment Distributor for a demonstration!



Here's your 76-page cost and production estimating book—newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!



## International® Construction Equipment

International Harvester Co.,  
180 North Michigan Ave., Chicago 1, Illinois  
A COMPLETE POWER PACKAGE

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Continued from page 52

used widely and effectively. Now numerous agencies are blending salt and calcium chloride, as a means of making abrasives effective at all temperature and humidity conditions. This blend has developed into the answer for making rock salt effective at practically all times, according to the Institute.

The reprint "Melt Ice Faster: With Mixtures" contains data concerning the effective application of mixtures of calcium chloride and rock salt to melt ice faster. Storage data are also included and the reprint is well illustrated. It is available free on request to the Calcium Chloride Institute, 909 Ring Building, Washington 6, D.C.

### Cold Speeds Maine Highway Construction

Cold weather normally hinders field construction, and introduces the need for design features that would not be required in warmer climates. So notes a bulletin of Fay,

Spoffard & Thorndike, Inc., consulting engineers, of Boston, in regard to road work in Maine.

In Maine, where work is currently in progress on a new interstate route from Portland to Yarmouth, this is only partially the case, said the bulletin. "True, the design presumes that there will be a minimum of 35 in. of frost below the surface, and that once every five years it may penetrate below this level. But in certain areas containing large amounts of marine blue clay, cold weather has aided both the field staff and the contractors.

"During the normal construction season, water may infiltrate through fine sand strata and soften the clay. When this occurs, it is impossible to operate excavating scrapers. Sometimes even big "Cat" tractors and power shovels must be worked on mats.

"Frost alleviates such conditions considerably. In clay cuts, for example, it has enabled the field crew to cut away the surface to subgrades and install drains without too much difficulty. The frozen crust has sup-

ported trucks carrying borrow and base materials across areas that in warmer weather would be impassable.

"By spring," concluded the bulletin, "the field engineers hope that the natural plus artificial drainage will result in a clay surface in the cuts relatively free of water and firm enough to carry the base and pavement. Until then, the lower the mercury the easier the work."

### Engineering Index

A new edition of the Engineering Index has been published. This 1,600-page reference containing over 30,000 annotations is available at price \$70 including postage on order from Earnest Hartford, Director of Promotion, The Engineering Index, 29 W. 39th Street, New York 18, N. Y.

Free on request is a catalogue outlining the coverage of each of the 249 divisions of the publication.

## DANLINE Sweeping Brushes Are Sweeping the NATION...

**BECAUSE DANLINE:**

- Outwears fibre 15 to 1.
- Provides up to 500 sweeping hours before replacement.
- Costs as little as 10¢ per sweeping mile.
- Works all year 'round.
- Assembles quickly on location without special tools.
- Fits all self-propelled, tractor-drawn and front-mounted sweepers.

Because — only a brush manufacturer with Newark's 66 years experience has the ability and facilities to develop a wire brush with the superior sweeping qualities of Danline. The success of Danline lies in the new and unique locked-in-place construction which permits a uniform fit of special round, crimped steel wire of unusual toughness. This construction means Danline gives you far cleaner, easier sweeping. In addition, Danline saves money because of longer wear and quick assembly. Find out now about these and other benefits. Write for illustrated brochure.

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85-27

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# for economical patch rolling—or complete surfacing jobs—



When using the Transport Attachment, the complete roller rests on the towing wheels—which are quickly and easily removed when roller arrives on a compacting job.



## GALION 3-5 TON TANDEM

ROLL-O-MATIC Drive provides AUTOMATIC multiplication of torque, AUTOMATIC application of power and AUTOMATIC regulation of rolling speed. There is no master clutch—no engine stalling or overloading.

Shock loads are cushioned—resulting in increased life of engine, gears, shafts, bearings, forward and reverse clutches. Reversing action is smooth.

Compression is variable from 102 lbs. to 155 lbs. per inch of roll width. Large compression roll is 48" diameter and 42" wide. Other features include dual controls, adjustable hydraulic steering, rugged straight line spur gear final drive, disc-type service and parking brake, and 32 hp gasoline engine.

## TRANSPORT ATTACHMENT

Save valuable working hours to and from jobs by equipping your GALION 3-5 Ton Tandem with this Transport and Towing Hitch Attachment. It consists of a pair of pneumatic tires on roller bearing wheels with stub axles, a tubular socket for the stationary axles, steel ramp block and towing hitch.

## GALION 4-6 TON TANDEM WITH RETRACTABLE TOWING WHEELS

When you want this roller on the next job, you simply hitch it to a truck and move a hydraulic control lever. The pneumatic towing wheels push down and raise the compaction rolls completely off the ground—ready for speedy, safe towing.

If close clearance rolling is necessary, such as next to a building, either (or both) of the towing wheels is instantly detached by removing a locking pin.

All other operating features are the same as on the Galion 3-5 Ton Tandem Roller. Bulletin No. 435 gives complete information—write for it.

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**VIBRATORY COMPACTORS • PNEUMATIC TIRE ROLLERS**

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| <input type="checkbox"/> Towing Attachment | <input type="checkbox"/> 13-20 Ton 3-Axle Tandems |  |
| <input type="checkbox"/> 4-6 Ton Tandem    | <input type="checkbox"/> Three-Wheel              | <input type="checkbox"/> Trench Roller         |

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# Another **OLIVER OC-96** **TRANS-O-MATIC** "talks for itself"

The busy asphalt paving firm of Chas. De Sorte & Son in Atco, New Jersey, cut loading time of fill in half with the new OC-96. "Where it used to take our old machine four minutes to load a 7-cu.-yd. truck, our new OC-96, with the same capacity, loads it in just two minutes," says Mr. DeSorte, Jr. "The time we save with the OC-96's power, easy maneuvering and easy handling lets us handle 15% more jobs than before."

Counter-rotation turns—a tremendous advantage of the OC-96 and exclusive in its size class—let this tractor

turn in its own length for the fastest loading of any its size. Oliver's Trans-O-Matic transmission eliminates clutching and shifting, saving more time and making the OC-96 the world's easiest handling crawler.

"We checked 'em all and found we'd have had to spend a lot more money to get the same production we get in the OC-96 from another machine," reports Mr. De Sorte. Why not make the same check and prove it to yourself. Then ask your Oliver distributor for a demonstration.



**NEW CATALOG—**  
"must" reading for  
cost- and comfort-  
conscious tractor users.  
Write for free copy.

LOOK TO OLIVER FOR YOUR BEST BUY IN WHEEL AND CRAWLER TRACTORS



**THE OLIVER CORPORATION**

Dept. 2232, 400 W. Madison St., Chicago 6, Illinois

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# Good Fills Back of the Shovel

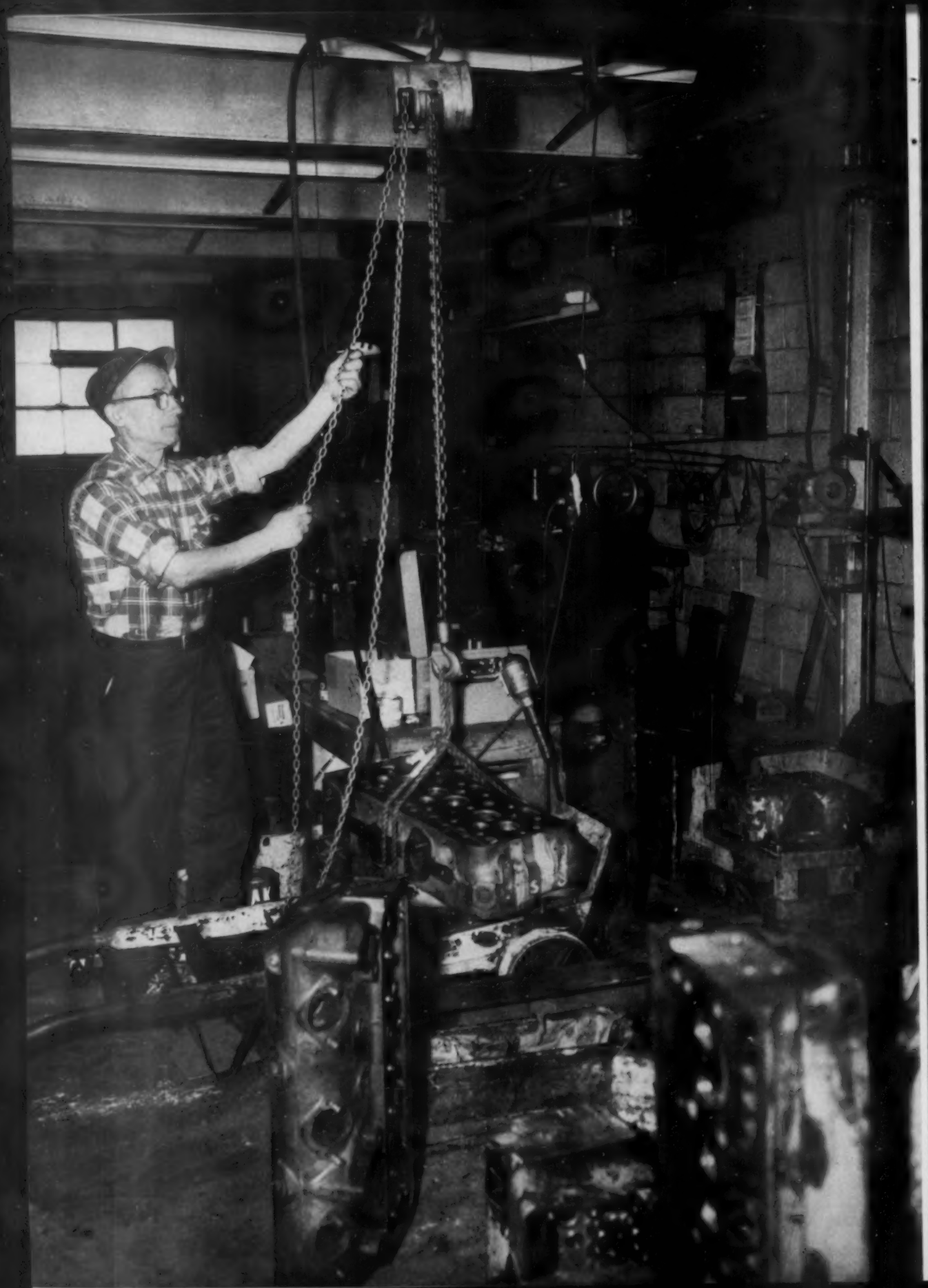
**M**uch has been published on roadway embankment design and construction. Most of the technical discussions on the subject have had to do with fine-grained soils. Tests for moisture control, compaction results and the presence of poor material are vitally important to securing good earth embankments. And contractors whose restless natures and push for production make them forget the importance of these controls, should get a frequent refresher. Settlement of roadbeds under modern highways is a costly matter.

Less often discussed, but a critical problem at times, is the proper construction of highway embankments from rock and mixed materials. The inspectors and project engineers often have had that comfortable feeling: "This is shovel stuff, so we haven't anything to worry about." However, "taint always so," as one veteran field engineer puts it. Some of the most serious trouble has come from fills built of rock and rocky mixtures. Such fills need careful control, especially when the mixture varies constantly.

As related in a report in this issue—the first of several on the subject—rock and mixed materials containing rock require careful advance design thinking and planning. They require a close cooperation between the contractor and the engineers. And, most of all, they require close hour-to-hour inspection by men who have experience and judgment with such materials.

The discussion of a Connecticut job and of this state's practice is carried in this issue. This is in continuance of Roads and Streets' emphasis on the basic problem of getting quality construction in the highway program, and of the twin problem of fostering a close cooperation between contractor and engineer.

**Harold J. McKeever**



One of Merritt-Chapman & Scott's engine overhauling specialists. The East Hartford Shop policy is to tear down and completely rebuild diesels when major work is necessary.



## How 'Largest Contractor' Overhauls Equipment

**Merritt-Chapman & Scott's heavy machines are completely restored between jobs as a company policy**

### Roads and Streets Staff Report

**"W**hether you own just a few hundred machines or hundreds, there's no way around it. You simply have to tear them down to the ground and rebuild them after a certain number of hours."

This philosophy explains the hustle that goes on in and around a collection of shop buildings in East Hartford, Connecticut. Here much of the equipment of Merritt-Chapman & Scott Corporation's Construction department comes for overhauling and reassignment. M-C&S is a spectacular name in heavy contracting. Besides big dam, power and tunnel projects, the firm builds many miles of roads and its equipment fleet reflects this broad spectrum of interest.

The East Hartford plant is an outgrowth of the Savin Construction Corporation which merged with M-C&S as a subsidiary. This shop handles heavy mechanical work for equipment within economic shipping-in distance. The magnitude of its operation is reflected in the tally of diesel and large gas engine overhauls, which run on the sunny side of 400 per year as part of the tear-down routine. Heading this work is Ira Davidson, superintendent of the firm's East

Hartford yard, under Sam Grattan, M-C&S's equipment manager, who reports directly to Myles C. McGough, executive vice-president for construction, in the company's New York City headquarters. Davidson is a veteran who dates from 1936 with the Savin organization, and an acknowledged leader in his field. Under his and assistant superintendent Charles Makers direction, some 85 mechanics, welders, helpers and drivers work on a steady year-round basis, under company policy which makes mechanical maintenance and repair a major element of construction management.

The East Hartford center is one of several maintained by the firm. Overhauling here is so expedited that any one time not over 20 or so major machines are in for the treatment. Machines are sent in from the job when work tapers off, or at other times under a policy of having a overhauled substitute sent out as replacement to keep project work going.

This entails close cooperation between central shop and field, which is where Davidson and his principal aids put on a strong and effective performance. Davidson spends much time in the field, conferring with



The M-C&S shop building (60' x 275') seen at left, and the welding shop at right. Large machines such as shovels are torn down in the yard, and components taken indoors for work when necessary.

project managers in setting up preventive maintenance facilities and routines, and in troubleshooting jobs where mechanical problems seem to pop up too often. At intervals all machines on the job are inspected as to condition, reports made to Davidson, and inspection checks made by visiting shop men, out of which machines are selected for shipment to East Hartford for major repairs or complete tear-down as seems necessary.

Davidson's check of project management of machines goes so far as to include insistence on a report on the condition of oil found in crankcases. A form must be filled out and submitted from the job to Davidson on the technical details needed to judge the presence, or absence, of harmful conditions. Visiting specialists help with this inspection, which is considered of critical importance in securing good engine performance and minimizing down time and overhaul cost.

A commercial laboratory takes part in this checkup. The report form used has headings for filling in data for each machine covering presence and amount of fuel dilution, soluble resins present, viscosity, mgs of metal, water and emulsion, gums, fuel soot, granular carbon, sand or dirt, etc.; plus data on oil operating temperature, oil change time, and engine speed readings.

The shop set-up is departmentalized much like many smaller contractor shops. Here are a few of the details:

1. The shop office is located in the center of a 60' x 275' building, immediately off the main overhauling area, and also convenient to the main parts and supply stacks. Using the Kardex system, card records are kept on the history of every equipment unit. One part of the card file gives a perpetual inventory of parts and supply items, which number over 20,000. Replacements are promptly ordered for items requisitioned out by a shop mechanic or field manager, as a means of maintaining sufficient stock. One of the most extensive catalog libraries you'll ever see is kept as an aid for clerks in ordering parts, accessories and supplies.

2. The high-ceilinged main shop room, 60' x 100', is large enough to accommodate seven or eight overhauls at a time. The north wall, under a large window area, is lined with benches and tool cabinets. The usual complement of grinders, hand-held drills, power wrenches, jacks of all types and sizes, and overhead cranes, helps make extensive use of this space.

The accompanying photos were taken at a time a consignment of International Payhaulers and other equipment from the firm's \$165 million Niagara Power

*Continued on page 138*



# How Practical Paperwork Improves Project Analysis

By James apRoberts

Cost Control Specialist, Chief Estimator, Pomeroy and Associates  
Pasadena, California

**T**he purpose of this series of articles is to discuss the use of cost controls as they apply to several of the divisions of a typical roadbuilder's organization. In many instances it can be seen that the use of cost control techniques will not only improve operations, but will also help to reduce the excessive costs and confusion which can result from uncertain knowledge about the actual operating costs.

Comments and inquiries from readers of *ROADS AND STREETS* regarding their particular cost control problems are always welcome. Whenever possible, such requests will be answered with a general discussion of each individual problem. In many cases, with the correspondent's permission, a more detailed analysis of similar situations will also be presented with the aid of the fabulous and mythical company of U. & I. Roadbuilders, Inc.

It is the author's experience from his work in the field, plus many years of developing and presenting college-level courses in construction operations, that for the one person who asks a pertinent question there are often a score of others who want the same answer but haven't asked out loud. So we shall always be glad to hear from that one contractor in twenty who will admit that he occasionally does have a cost control problem.

The previous article (No. 4), in April, was a study of the important position held by the Timekeeper; and the value of his services in securing information that is not only accurate but also of definite value in analyzing both project and job operations costs.

In that article it was noted that the value of a timekeeper depends on more than just his personal qualifications. It hinges also on the people he must work

with and the character of the information he is expected to obtain. There must be an understanding by the Project Manager or Job Superintendent on just what data the foreman must give to the Timekeepers. This same understanding also has to be passed on to the Foremen, so that they in turn realize that cooperation with the Timekeeper is a definite part of their job.

Furthermore, there is a limit to the duties and assignments which can be adequately handled by a single individual. Saddling the Timekeeper with extra duties, which are often in the province of the Project Engineer or Safety Superintendent, is often a form of false economy because it results in making the Timekeeper a jack-of-all-trades and master of none. It jeopardizes the work which is the main reason for his being on the job.

In this same regard, it is also important that both the Estimating and Accounting Departments should periodically look at the data which they have been obtaining from the field operations. This is in order to be certain that the data are actually what is needed. The requirements for various types of cost and performance information are frequently in a state of transition or flux. It is not unusual for either Estimators or Accountants to assume that, by making a very detailed analysis of the labor, material and equipment required for a certain construction operation, this same data can be used in a yardstick in evaluating the cost of a large volume of somewhat similar work. In some cases such an assumption may be very valid. In other instances other factors not considered in the original study may enter the picture and result in a different rate of production.

*Continued on page 145*

## Getting Good Road Embankments with Rock and Mixed Materials

**1 — A rough, tough Connecticut Job. First of several reviews of state highway practices, specifications and project data on this subject.**

**W**ill the material out of that rocky hill make a good embankment? This question is a vital one on many road jobs. It affects the contractor's procedures. And it is often asked by engineers, who are concerned with watching the mixture delivered to the grade and in exercising vigilance in blending and in general inspection.

The fact is that rock and mixtures containing rock haven't always produced perfect highway fills. Here and there uneven or excessive settlement has occurred, indicating that the problem is often less simple than merely end-dumping 2 or 3 ft. layers of shovel rock and keying the material with a few dozer passes.

A roundup of ideas and quotes from practice was sought by *Roads and Streets* on this subject—as a departure from the much-discussed problem of constructing highway embankments with fine-grained soils. The editor's query among the state highway departments

brought a number of thoughtful discussions. Several of these will be published in succeeding issues.

These notes, as a starter, have to do with Connecticut—a state where heavy grading in rock often is required in highway construction.

A rock grading job illustrative of Connecticut's problems and procedures is Contract 140-108 for a relocation segment of Connecticut Route 8 in the towns of Thomaston and Litchfield. Awarded to Savin Brothers, Inc., of Bloomfield, Conn., this contract covers clearing, drainage, structures, grading and paving for 23,000 lin. ft. of dual express highway on new location; north and south bound roadways on independent profiles and staggered elevations.

The \$4 million contract was awarded in mid-January, 1959, and work begun at once on the heavy clearing. The job carried a 710-day time limit, with \$300 daily liquidated damages for delay in completion of





One of the larger embankments on the Connecticut Route 8 job, well on the way up. Slope rough dressed as work progressed, using topsoil materials.

the south-bound roadway by September 1, 1959, to permit access to a new dam in the area. All rock excavation in the job (nearly a million cubic yards) had to be completed by that date.

Because of the job's size and anticipated complexity, the state's standard specification form 808 covering excavation and embankments was augmented by elaborate special provisions. The contract document included a "Sequence and Limitation of Operations" section, covering among other things the opening of the southbound roadway, complete with temporary surfacing, at the September 1 date.

Crowding the clearing crews, dozer operators tackled topsoil stripping and removal of the soil mantle on selected hills. There immediately loomed a major problem: that of securing a stable foundation for the heavy fills out of available materials. This required careful material selection, and close inspection, from

the start. A complicating factor was an over-balance of rock materials, as against a decreasing excavation of the soil mantle. (A sidelight: the contractor bid the excavation by unclassifying earth and rock at the same unit price, \$1.10).

Although the contract carried 21 specialty bid items, the chief problem from the onset, therefore, was that of getting production through a variety of rock cuts to 90 ft., depth, and of properly building up and consolidating embankments to depths often from 40 up to 90 ft. To speed the work, rock drilling and blasting were subcontracted to Rock Construction Corporation, of Kingston, N.Y.

Substantiating the pre-contract borings, the rock materials encountered were found to be chiefly mica schist and pegmatite, with numerous thin, scattered granitized zones, slightly weathered joints and soft



One of the bigger hills, where drills are just beginning on a deep cut. Inspector's problem was to evaluate the earth mantle material for suitability in the embankment.

areas. Occasional local areas of very hard fine-grained granitized schist also were found. All rock materials made good fill when properly used.

Production soon reached 10,000 cu. yd. daily and higher using two 10-hour shifts, despite the slowing factors of early, steep haul roads, drainage work, and wet conditions. The drilling equipment consisted of two 6½-in. tractor-mounted, one 4-in. crawler and two 3-3½-in. crawler-mounted units. Compressors totaled 3,600 cfm capacity. Savin Brothers, Inc., for their end utilized three heavy shovels, 14 rear-dumps, 6 tractors and other equipment.

Preliminary ground preparation

was a major consideration. Ordinarily the Connecticut state requirement is to plow and bench all foundation areas on slopes steeper than 1 vertical to 3 horizontals. On this job, sharp-eyed inspection quickly showed it advisable also to cut back the tops of rock slopes, where fissured strata meant seepage and possible slides during or following the construction. This condition had been found on a nearby Corps of Engineers dam and railroad relocation project, resulting in a slide and worker death, and also a long delay for redrilling and removing the rock overlays.

Extra footages of underdrains also

were prescribed during the work progress, following experience with the parallel railroad relocation project.

Ten major rock-filled embankments were constructed in the 1959 season. These fills, or portions of them, were made predominantly from rock fragments and spalls and finer fragments or earth for filling the interstices and forming a solid compact mass. The nature of the mica schist was such that, by filling in layers not exceeding 3 ft., the equipment movement pulverized enough fragments to completely fill the rock vortices.

"Thus, from the standpoint of



compaction and dry-density control, little remained to be desired," was the project engineer's comment. However, this very condition was responsible for added wear and tear on the equipment, which inevitably required heavy maintenance and repair.

Rock filling as well as shovel work lent itself well to the winter weather, and early progress was steady. As the 1959 spring opened up, the top 12 in. carpet of filling material often turned into a thick, slippery paste similar to moist graphite, due to the mica flakes.

Boulders, while often encountered, represented no serious problem. One 300-ft. area contained segregated boulders from 2 to 95 cu. yd. in size. These were drilled and shot producing fragments not larger than 3 ft. for placing in fills.

A real cause of worry was the frequent and unpredictable presence of slickened sides on many foliations and joint surfaces exposed by the shovels. On the northbound roadway, where foliation planes dipped 30 degrees or more, east to west, these seams when exposed to surface water became lubricated, releasing large blocks of inclined ledge as slides. The east-side cuts along much of the northbound roadway therefore had to be cut back repeatedly until a stable condition was attained.

Consolidation of fills was done chiefly with dozers and passages of the hauling equipment. The contractor, discouraged over the high replacement of tractor track treads and rollers due to the abrasive, dusty materials, tried a large-rubber-tired dozer for a time. This machine which has performed exceptionally on other work suffered high blade and tire costs on this rough work. Crawler dozers (principally Caterpillar D9s) continued to do most of the spreading and mixing.

Some concern was felt by the state engineers when the contractor decided to speed up all operations, his purpose being to eliminate the cost of a temporary roadway and place concrete pavement for the southbound roadway in time for the September 1 opening. More rapid construction added to the inspection load. And some engineers felt that the high fills should be carried

*Continued on page 132*

Deep cuts in hilltop being made by Ingersoll-Rand Quarrymaster drills using 6½-in. bits.



High production was aided by ample compressor capacity. This unit is a Gardner-Denver 900.



Showing a mixture of boulders, smaller shot rock and earth being worked by heavy dozers into a fill layer. Dozers performed much horizontal yardage movement on this project.



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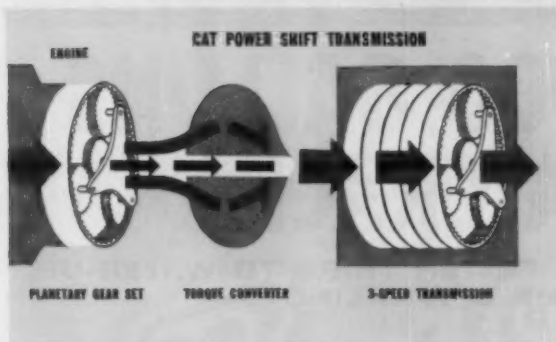
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**33% more production!** Overburden, running to 60', is blasted and then cleared by a D9E. Owner: McCoy Coal Company, Gorgas, Alabama. 1,800,000 yards is moved to mine 150,000 tons of coal per year.

Trading in another large track-type machine for a Caterpillar D9E Tractor has brought *big* production increases to two strip mine operators—increases that prove these power shift machines are quickly paying for themselves on the very tough jobs found in overburden removal.

"We're getting half again as much production with no additional cost," says F. M. Carmichael, part owner of Carmichael Coal Co. near Calumet, Ala. "Power shift cuts operator fatigue and increases the maneuverability of the tractor." That's exactly the reason for designing a Caterpillar transmission with a one-hand control which shifts into all speed ranges, forward or reverse and on-the-go, without braking, and without a master clutch.

Earl McCoy, owner of the McCoy Coal Company, Gorgas, Alabama, has had nearly as good results. "We're getting 33½% more production with the D9E over the machine we traded in... it's more economical to operate."

The D9E, like all Caterpillar track-type Tractors, has lifetime lubricated track rollers (with the exclusive patented floating ring seals) that never need servicing. Also a dollar-saving dry-type air cleaner that can be serviced in just five minutes, yet filters the air 99.8% clean *even in the worst dust conditions*. And shifting is so easy the operator just naturally gets more work out of the tractor. What's more, he gets it on the toughest, most demanding jobs.

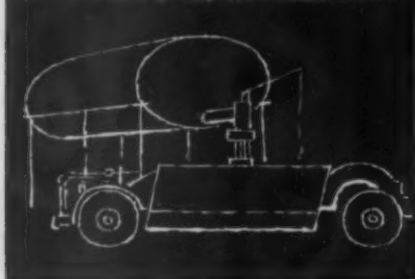
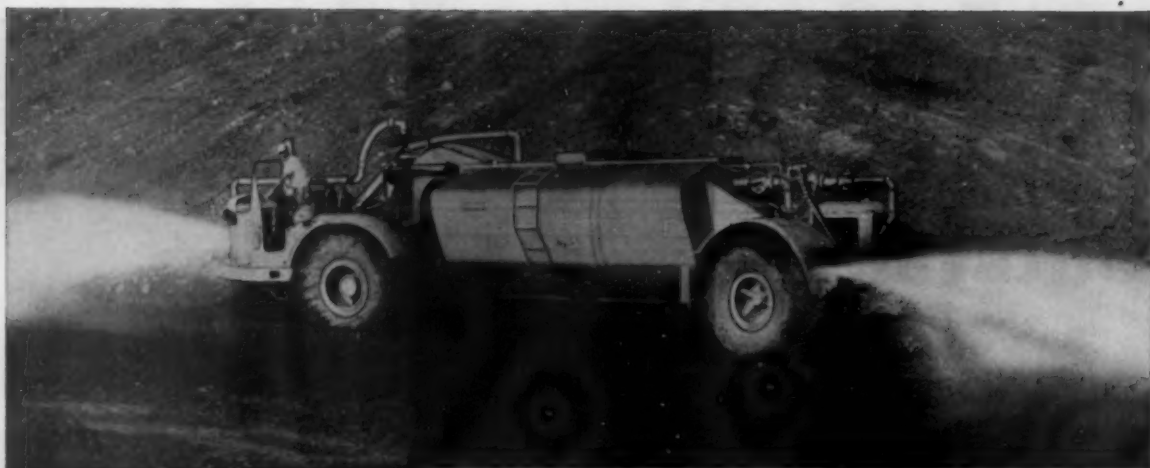
Besides power shift transmission, you have your choice of direct drive or torque converter in both the 335 HP D9E and the 235 HP D8H Tractors. For complete details on the new power shift transmission, see your Caterpillar Dealer. He's ready to show how it works... demonstrate ruggedness under complete, easy one-hand control!

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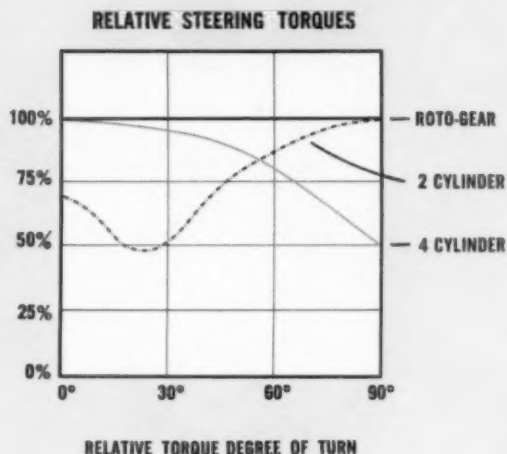
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**TURN PAGE**

# SELF-PROPELLED SCRAPER STEERING SYSTEMS

Control is of great importance when handling loaded scrapers with weights in excess of 80 tons. Steering must be smooth and responsive in all stages of operation. Anything short of this sacrifices production, safety and operating ease.

The graph on the right compares typical steering torque curves for the three steering systems now used by major scraper manufacturers. The curves shown are actual torque curves from current models. As you can see, the Roto-Gear torque is consistent throughout the steering arc, while the torque of the 2 cylinder and 4 cylinder ram & lever systems vary considerably at different points in the turn.



## TWO CYLINDER STEERING

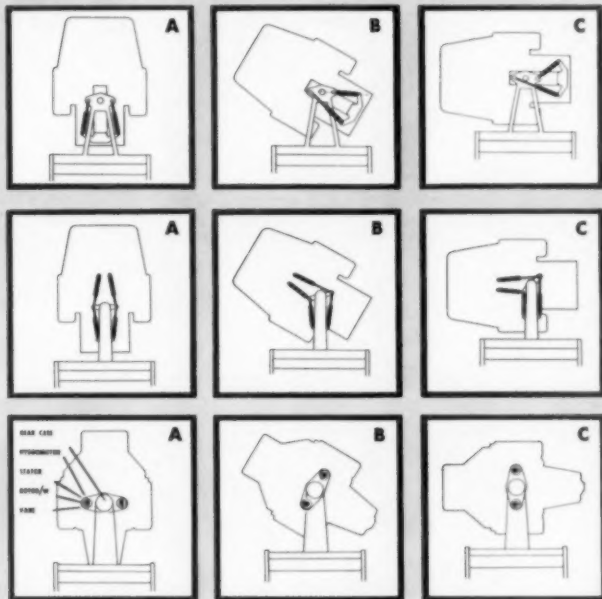
In this system, each of the two double-acting rams works in opposition to the other. Note that in the position indicated in figure 'B', the right arm is in a direct line with the pivot point and can neither push nor pull. Therefore, the right ram must coast through this point leaving the left ram to do the work. This accounts for the loss of torque at this point as shown on the above graph.

## FOUR CYLINDER STEERING

In this system the two left rams work together and the two right rams work together. All rams are double acting. With this system, the more nearly the rams are in a straight line, the more effective the steering. As they approach a right angle position, relative to each other, they lose their effectiveness and suffer a loss of steering power. This will be noted on the graph above.

## ROTO-GEAR STEERING

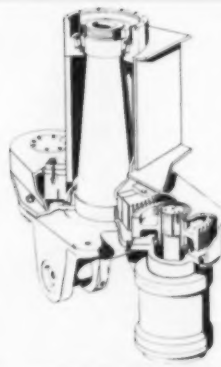
In the Roto-Gear system, there is an even constant pressure against the Hydromotor vanes at every point in the turning arc. Both Hydromotors are in full operation at all times—providing even power throughout the turn.



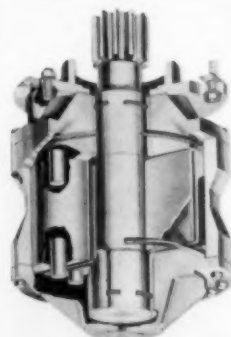
## ROTO-GEAR STEERING SYSTEM

With Roto-Gear steer, there are no hydraulic rams. Instead, compact Hydromotors operate the steering gear. As the turn is begun, the hydraulic pump sends fluid into one side of each Hydromotor, causing pressure against the rotor vane. The rotor of each Hydromotor then turns, causing the steering gear to turn in relation to the turn of the steering wheel. The advantages of this system, used ONLY on the Curtiss-Wright scraper line, are (1) Smooth, responsive steering throughout the entire turn, and (2) Elimination of awkward, external steering rams.

For complete details on all the C-W performance features, see your Curtiss-Wright distributor.



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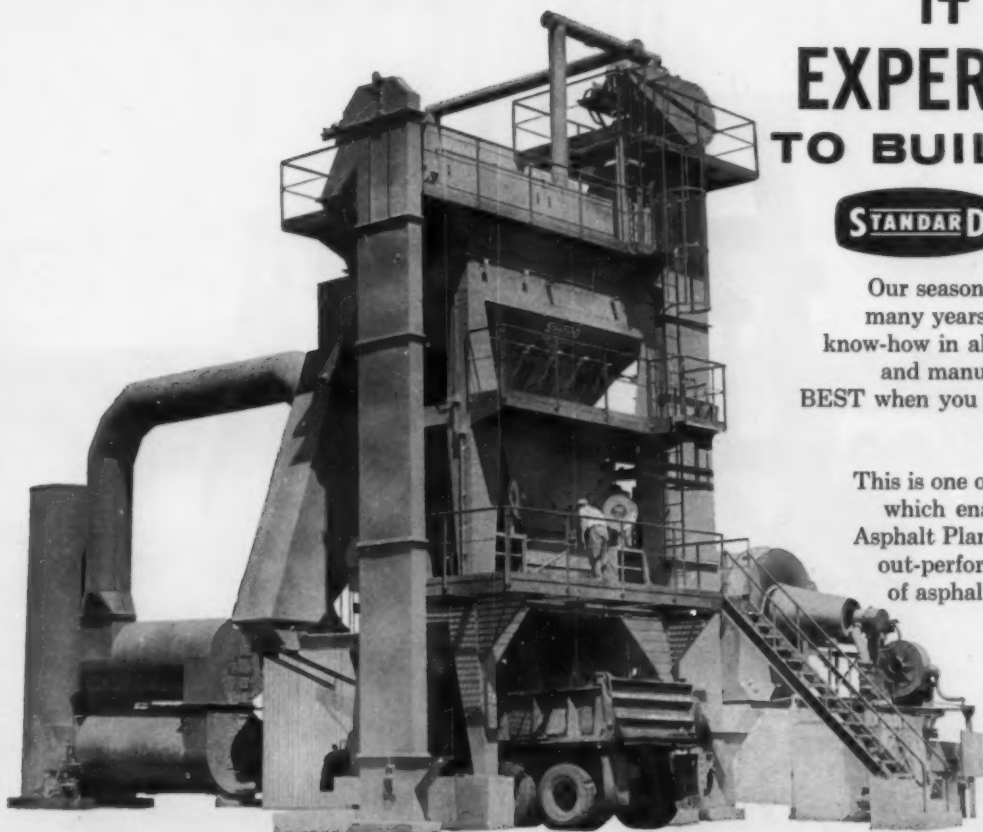
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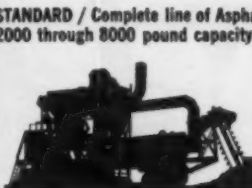
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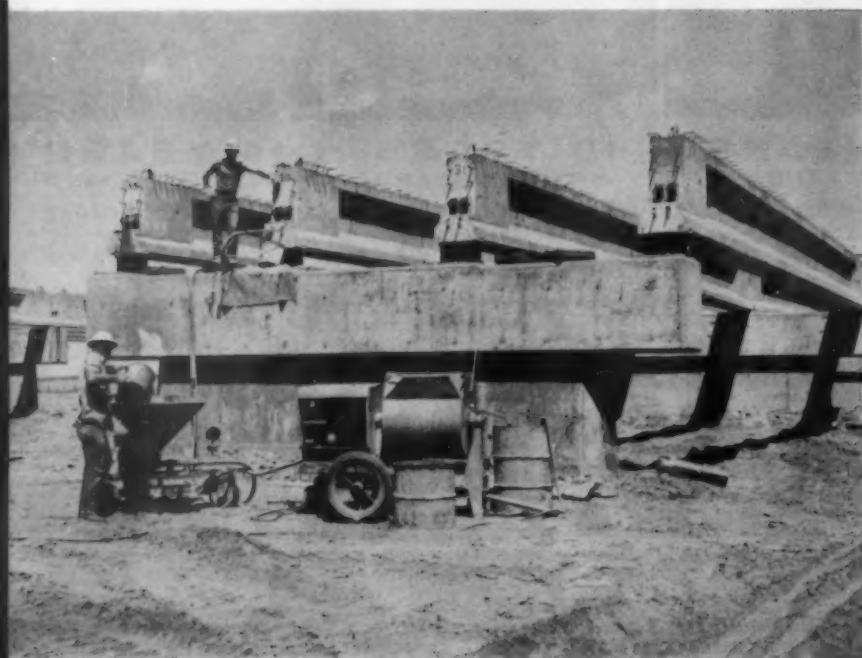
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ROADS AND STREETS, June, 1960



The contractor elected to grout the tensioned rods after the girders were in position rather than before transporting.





Dollies with hydraulic hoisting and lowering mechanism, designed by A. S. Horner Construction Company, expedited the project here described.

## Experienced Crew Takes Prestressed Girder Job in Stride

By H. K. Glidden  
Contributing Editor

**C**ONSTRUCTING and setting 248 large post-tensioned concrete girders for a Colorado state highway bridge was a familiar, easy job for the crewmen of A. S. Horner Construction Company, Inc., of Denver. It was a case of experience paying off for this company, which the previous year had gotten an intensive hazing in prestressed concrete girder work on the Air Force project at Colorado Springs. The Horner firm, with this second year's experience, is well on the way to being a journeyman specialist in this type of bridge construction.

The girders here discussed were for 1,100 ft. and 700 ft. twin concrete slab and girder bridges on a segment of Interstate 70 just east of Denver. The bridges were the largest of 22 structures in a \$2.2 million roadway and bridge contract awarded late in 1958 and completed during the 1959 season, these four bridges however being the only ones involving prestressing. Horner's experience and knowledge of costs were capitalized when the firm's bid for the 248 girders was substantially under the cast-in-place concrete or steel girder alternates.



Cable assemblies tensioned for holding in position, and forms also held in place, by a 3-ton chain hoist. Man in center is checking cable height, while men at far end apply tension.



Showing girder form in place and steel set, ready for concrete.



Prescon prestressing equipment included air-operated pumping unit and 6-in. direct reading hydraulic gauge.

The Horner organization had gained an enviable reputation for its skill and efficiency in casting, prestressing and setting 120-ft.-long, 97-ton girders at the Air Force Academy—the heaviest such girders built in the U.S. up to that time.\*

**Girder Design.** The 248 post-tensioned girders were all cast to the same basic cross section, (AASHTO Type III), 45 in. high by 22 in. wide at the base. Lengths were 57'9" and 57'1¼" respectively for the two pairs of bridges. While the Colorado department of highways has standard specifications governing such girders, its staff relied heavily on Horner's experience and judgment on this job. The ready-mixed concrete, commercially supplied, was in effect produced to a mix design and consistency controlled by the contractor on an end-result basis. The specifications required 5,000 psi at 28 days and 4,300 psi before starting the tensioning. Curing methods were at the discretion of the project engineer. Based on the Prescon method, the contractor submitted drawings of working details of forming and fabrication to supplement the state's design drawings.

Mild steel reinforcing consisted of conventional deformed shapes in four assemblies. Stressing elements were also in four assemblies.

**Organization and Scheduling.** The Horner organization synchronized the prestressed girder work with the other bridges, several experienced foremen working under a superintendent and at times personal attention of A. S. Horner, company president.

For the prestressed units the work was organized around a casting schedule of 36 cu. yd. per hour. The girder crew in turn set up a schedule of five girders per 9-hour day. This quota set the pace for forming, pouring, stripping forms, tensioning and girder transport and setting. The pier foremen on the four structures also followed a close schedule to keep ahead of girder arrivals; they were particularly concerned with accuracy of location of pier seats, to insure that arriving girders would fit perfectly.

Concrete for the girders was sup-

\*See *ROADS AND STREETS*, "97 Ton Prestressed Girders Set With Special Gentries," November, 1957.

plied by Ready-Mix Company, of Denver, from a dry batch plant set up near the casting bed and the job. Cement sufficient to keep the job going between tanker arrivals was stored in a stationary Trailmobile 175-bbl. tanker. Concrete was mixed in transit.

**Girder Casting.** Girders were cast in two yards, one at each of the pair of bridges. Each site had 25 beds, this large number being an important factor in keeping the job on schedule. Beds were paired, with alternately 6 and 12 ft. space between, the wider spacing allowing passage of concrete trucks and other equipment. Each bed consisted of a level concrete slab 22 in. wide and about 70 ft. long. Slab surfaces were carefully troweled to a true finish, and were cleaned and oiled after each job to insure an accurately formed girder bottom.

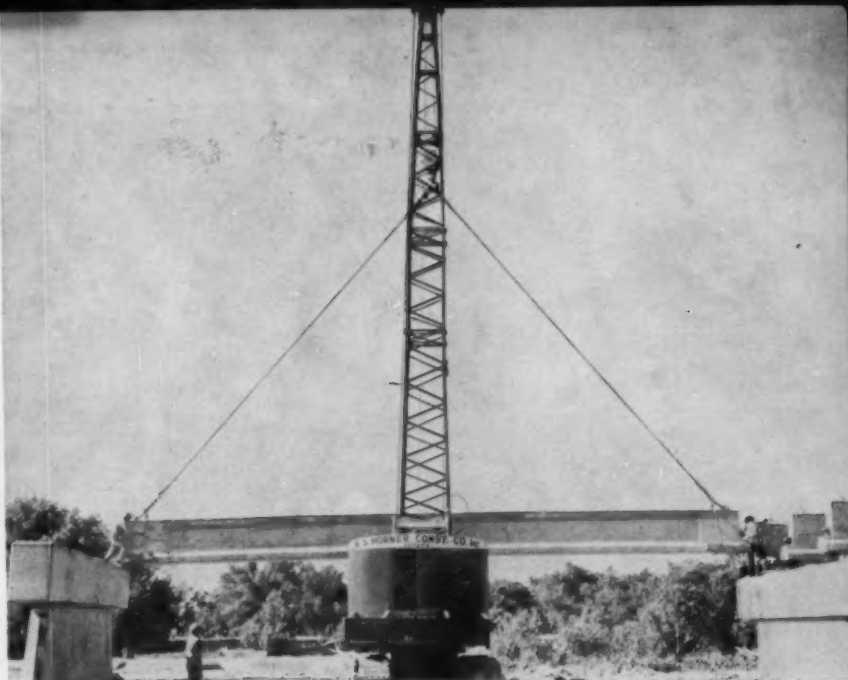
The bed length provided about 6 ft. of floor at each end for supporting heavy end forms, handling the chain hoist, etc., as well as performing the post-tensioning.

The first step in girder forming was to set the steel end forms. Next, the four prestressing tendons were fastened in place between end forms, which were pulled into position with chain hoists. This caused the tendons to hang in a true catenary, regulating the height of the tendon at mid-point of the bed. Each chain hoist was fastened to a lug on the back of the form, and was anchored to the bed by a cable loop. Once the tendons were properly positioned, they were sealed against entry of girder concrete by wrapping all joints with 2½-in. Permacel tape. From this point on, it was simply a matter of placement of the mild steel reinforcement bars and securing of the side forms in position for the pour. Sectional side forms were held tightly against the end forms by long screw clamps.

The 1½-in. slump concrete was vibrated using two Viber units.

Form sections, reinforcing steel and tensioning assemblies were handled by a Lorain 25-ton crane. Steel and the tensioning assemblies were set at bed ends to reduce lateral crane travel.

**Girder Stressing.** Stressing assemblies, hydraulic jacks and associated equipment were furnished by the



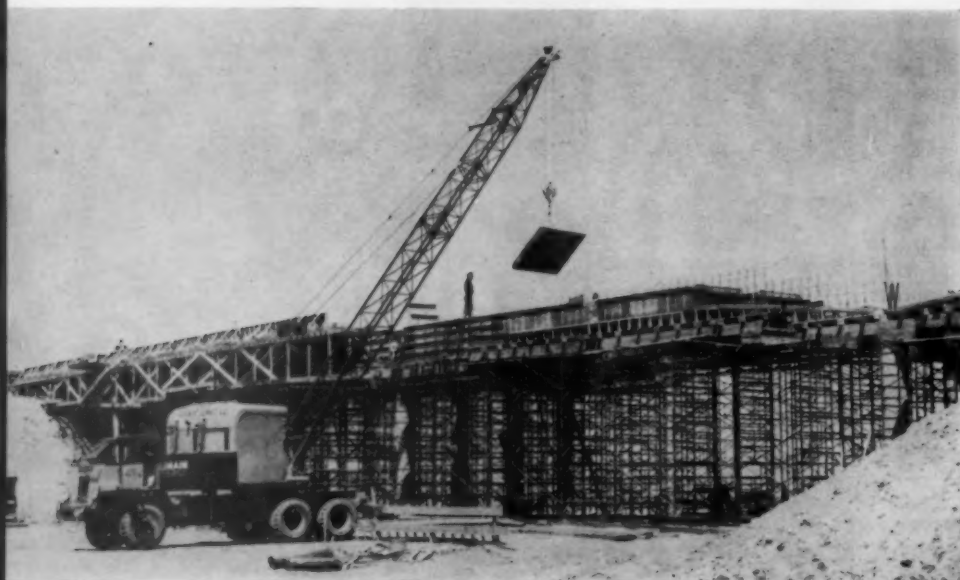
Girder held over its seat locations by the Link Belt Crane, while man on each pier guides beam to pins in the pier fitting.



Total stress of 158,000 lb. being applied for post-tensioning, using a 100-ton hydraulic ram, compressed air operated.

Truck-mounted welder on hand for beginning of deck work involving reinforcement cutting, etc. Note cross-beams poured between prestressed girders.





Getting ready to pour the shear-connected deck slab, following placement of prestressed girders. Lorain motor crane is handling form panels.



One way to maneuver the heavy girder-carrier dollies: dozer operator has picked the dolly up by fitting the blade under the rear corner and holding the frame upright with a cable back over the blade.

Prescon Corporation. The stressing tendons consisted of 18 high-carbon, stress-relieved,  $1\frac{1}{4}$  in. dia. wires enclosed in  $1\frac{1}{8}$  in. flexible metal hose. These wires had a guaranteed ultimate strength of 242,500 psi. One tendon end terminated in a steel spreadplate which anchored the 18 strands. The other end terminated in a threaded stressing washer and bearing plate.

Stressing equipment consisted of an air-operated Sprague pumping unit, the single unit actuating two 100-ton Simplex hydraulic rams, one at each girder end. To overcome friction and provide the required loading of 170,000 psi, the

tendons were stressed to 180,000 psi prior to inserting precut shim plates which were designed for the transfer force of 150 kips. The pre-cut shims insured uniform and accurate elongation at transfer from jack to shim. The direct reading of a 6-in. Ashcroft hydraulic gauge provided a double check on the computed elongation.

Increment shims were available to extend the elongation, but were seldom necessary. The final working force was calculated as being 128.5 kips (145,000 psi) and resulted in the design camber of  $\frac{3}{4}$  in. at the center of the girder.

A 3-man crew stressed girders at an average rate of one every 15

minutes. An Ingersoll-Rand 210 compressor furnished air for the equipment.

**Girder Grouting.** After stressing, the  $1\frac{1}{4}$  in. flexible metal hose was grouted with a mixture containing 1 lb. Interplast B (Sika) to 1 sack of Type 1 portland cement. The grout was mixed in a small building mixer to a pumpable consistency. A Moyno 3L3 pump forced the grout into the tendon at about 30 psi pressure after the grouting fittings and tubing had been blown clean with compressed air. As soon as the grout flowed freely from the fitting at the far girder end, this

*Continued on page 83*





Brief unloading time was all the rest allowed Mack tractor before starting the 200-mile return run to the plant for another load. Each Newcrete beam was 30 inches square, 45 feet long and weighed 14 tons.

## Giant bridge beams ride through the Appalachians From Roaring Springs to Shinglehouse

A bridge construction job at Shinglehouse, Pa., called for on-schedule delivery of 60 pre-stressed Newcrete concrete beams—each 45 feet long and weighing 14 tons. From its plant at Roaring Springs, New Enterprise Stone & Lime Co., Inc., sent its B-83 Model Mack six-wheel tractor 200 miles over some of the most rugged mountains in the east with two giant beams at a time. After each delivery, the empty unit hurried back to the plant, reloaded, took on a new driver and started another 200-mile grind to the job site. The Mack tractor took the day-in, day-out pounding of the

30 grueling round-trips in stride—delivering all 60 bridge members right on schedule.

Macks have the stamina to deliver top-capacity loads in record time—day after day, month after month—with minimum upkeep requirements . . . the power that makes light work of steep grades and rough terrain . . . the positive traction—provided by Mack's Balanced Bogie with Power Divider—needed for sure-footed hauling through mud, sand, gravel and snow.

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## AMSCO HELPS YOU MOVE MORE TONS PER DOLLAR

*How a large contractor and a  
crusher manufacturer have cut downtime and  
increased service life with AMSCO equipment*

### DAILY "TOOTH REPAIR" ELIMINATED BY SWITCHING TO AMSCO 2-PART TEETH

Mount Vernon Contracting Corp. is a large general contractor doing work throughout the middle Atlantic states. Its present contract is for road construction on the Cross Westchester Expressway, linking the New York State and New England Thruways.

The firm's four power shovels and two backhoes on this job are equipped with Amsco dippers or dipper parts and Amsco Simplex\* 2-Part Teeth. Reason:

competitive teeth previously used required daily welding build-up to maintain their points. Now, since switching to the Amsco Simplex, teeth are changed only about once a week. And change-over is only a 5-minute job!

With shovels operating 8 hours a day, 5 days a week, this is a mighty important advantage for Mt. Vernon. No wonder they say—"These Simplex teeth really stand up in service, especially in rock, and save us a lot of downtime."

\*Patent No. 2,904,908

### AMSCO CRUSHER ROLLS HANDLE 50,000 YDS. BETWEEN BUILD-UPS



Carroll Hicken (left) owner of Highway Machinery Company, Waukesha, Wisconsin, is a long-time user of Amsco equipment. His firm designs and manufactures self-

propelled machines for crushing road material, both gravel and stone. All of their machines are rented out or sold to contractors, with maintenance and service handled by Highway Machinery.

For years, the company has used Amsco Manganese Steel Crusher Rolls exclusively. Amsco Manganese welding rods and bars are also used for build-up. On a typical rental machine, pictured at right, the Amsco rolls had crushed over 50,000 yds. since their last build-up six months before.

Mr. Hicken says that with Amsco Manganese rods he can multiply the life of a roll by 5 to 10 times. He adds—"They have proven very fine, and we're getting more yardage than with any rods we formerly used."

AT  
MT. VERNON  
CONTRACTING  
CORP.

AT  
HIGHWAY  
MACHINERY  
COMPANY

# AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

Other plants in: Denver • Los Angeles • New Castle, Dela. • Oakland, California • St. Louis

In Canada: Joliette Steel and Manitoba Steel Foundry Divisions

Welding products distributed by Canadian Liquid Air Co., Ltd.

AMERICAN  
**Brake Shoe**  
COMPANY

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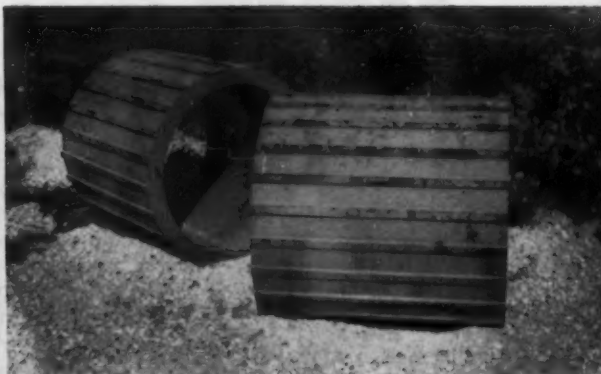


◀ Northwest shovel, equipped with Amsco Dipper and Simplex 2-Part Teeth, at work on Cross Westchester Expressway project.

Shovel operator, Walter Reich, inspecting Amsco Simplex 2-Part Teeth used on Mt. Vernon Contracting Corp. shovel. ▶



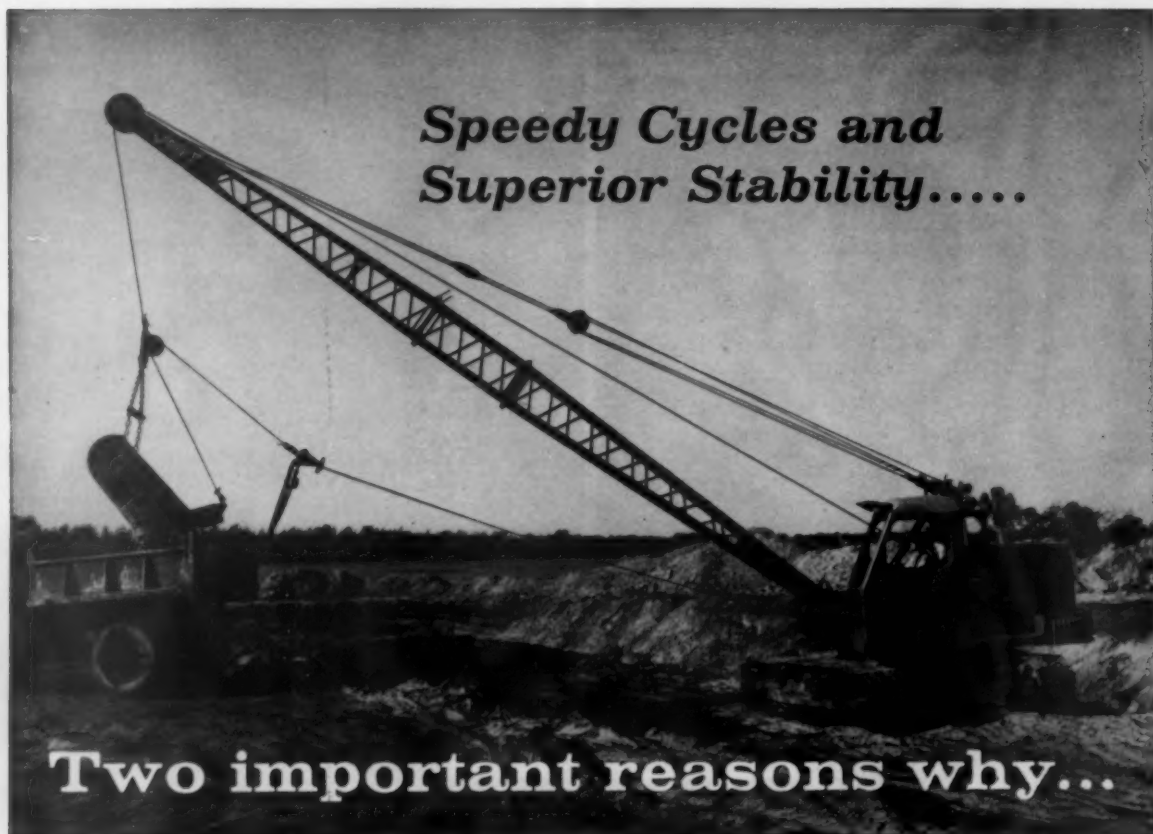
Highway Machinery Co. portable crusher, equipped with Amsco rolls, at work in a pit. Machine crushes 175 yds. per hour to  $\frac{3}{4}$ " size.



Amsco 25 x 24 manganese steel crusher rolls, of type used in portable crusher at left.

Welder demonstrating how Amsco Manganese rods are used for build-up on rolls.





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Superior Stability.....*

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You'll find two essentials of profitable dragline service combined in a UNIT — speedy operating cycles, through full use of power, and outstanding stability. You save power and gain speed with UNIT direct-in-line drive from engine to main machinery. Power is transmitted through a worm drive with minimum loss due to friction. This is one of many UNIT built-in values that pay off in greater job output.

UNIT extra long crawlers and wider axles and shoes provide perfect balance, too. Stability is superior . . . you can work faster without continuous tipping on long or low boom work.

A UNIT DRAGLINE gives you these two important advantages . . . and many more. You get a one-piece cast main machinery gear case with all gears, shafts, and bearings operating in an oil bath; automatic traction brakes; twin hook rollers; and all disc-type operating clutches.

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## EXPERIENCED CREW

*Continued from page 78*

fitting was sealed with a hardwood plug. The plug was notched to allow bleeding of water which occurred for about 4 hours. While the grout was of a rather soupy consistency, the Interplast B eliminated shrinkage almost completely.

The contractor had the option of either grouting the girder on the bed or in place on the piers. Pier grouting was preferred, as the specifications required 72 hours curing after grouting. The main drawback to pier grouting was the possibility of splashing grout on the piers, and the ensuing expense of cleaning it off.

**Girder Placement.** Girders were transported and placed on the piers by an iron worker superintendent, crane operator and two laborers, using two contractor-designed dollies, a Cat D6 dozer and a Link Belt K360 crane.

The dollies, designed on the basis of Air Force Academy experience, straddled the girder and made use of hydraulic jacks to lift the girder tightly against the dolly. The front dolly was equipped with a tongue for pulling with the D6. One chain hoist was attended by a laborer during hauling to prevent the girder from tipping sideways.

On reaching the piers the girder was lowered to the ground and the dollies hauled away. The D6 operator used his dozer blade to lift one dolly off the ground while backing it into position to be attached to the tongue of the other dolly—a one-man operation.

The crane used two equal-length cables to lift the girder into place. Two iron workers, one on each pier, manhandled the girder into position over the plate pins for seating.

**Test Results.** The high strength concrete design was successful, to the extent that 4,300 psi required before starting tensioning was reached in 4 days, and the specified 28-day strength of 5,000 psi was often greatly exceeded. Random cylinders tested as high as 4,400 psi at 4 days, and tests of 500 cylinders at 28 days ran uniformly between 6,700 and 6,900 psi.

**Acknowledgements.** This project



By using prefab forms on their pours the contractor on St. Louis Mark Twain Expressway, R. B. Potashnick & J. S. Alberici Construction Co., has put the job ahead and economized by multiple form re-use.

## Prefabs Speed St. Louis Expressway Structures

Destined to become a major link in St. Louis complex metropolitan traffic pattern, the downtown phase of the Mark Twain expressway at 7th and Cass Avenue has involved much structure work.

In describing the specifications project manager G. J. Alberici for the contractor, R. B. Potashnick & J. S. Alberici Construction Co., St. Louis, said that their job, Project No. 1892 (20), calls for extensive retaining walls, many of them double battered. The result is that prefabricated forms were set at an angle to give the required 12 in. top wall thickness, and up to 3 ft. thickness at the base, with heights varied from 4 ft. to 34 ft.

The contractor, a prefab form

enthusiast, had been using them for nine years for all types of heavy construction including water treatment plants, buildings and highway work.

For those varied specifications to pour footings, retaining walls, abutments, piers and beams the contractor elected to use 8,000 sq. ft. of wood and 20,000 sq. ft. of Symons Steel-Ply forms. By using the forms Potashnick & Alberici have kept well ahead of schedule.

The contracting firm had obtained 30 re-uses of the forms at the job's third point, and still was enjoying use of most of the form footage of the original order.

Engineer for the project is Sverdrop & Parcel, Inc., St. Louis. James J. O'Rourke is superintendent and John J. Burke is assistant project manager.

was carried out under the supervision of personnel from Colorado Department of Highways District No. 1; George N. Miles, district engineer, Glen McEldowney assistant district engineer, F. O. Stearns dis-

trict construction engineer and F. P. McNamara resident engineer. O. H. Starkey was job superintendent for A. S. Horner Construction Company, assisted by Mel Schlichter in charge of structures.



Wire fabric reinforcement, more widely spaced dummy joints, among features of design for very heavy future plane loadings.

## Paving Design for Super Airport

**By Walter G. Metschke  
and Robert L. Novak**

Director of Engineering and Assistant Director of  
Engineering, respectively, Naess & Murphy,  
Consulting Engineers, Chicago, Illinois

**W**hen our firm was engaged by the City of Chicago to prepare designs and specifications for enlarging and improving O'Hare International Airport, one of our primary concerns was the design of runway and taxiway pavement itself. O'Hare's \$120 million improvement program includes terminal buildings, concourses, fuel storage system, parking facilities, utilities, and service roadways. But the terminal's ability to function as a world leader in the jet age hinges on having pavement strong enough for present planes and bigger ones to come.

Immediate construction includes a second extension



Workers fill pre-formed joint with two-component polysulfide joint sealer. Mechanical intrusion assures absence of air pockets and results in uniform, tightly sealed joint. A grooving tool is then used to remove excess sealer  $\frac{1}{8}$  in. below the surface.



Contractor-built machine used to form slot in freshly placed concrete, plastic joint former is then inserted as shown, and concrete is finished over the plastic form which is later removed.

on the southeast end of an existing runway (14R-32L) from 8,838 ft. to 11,600 ft. (Last year, 838 ft. was added to the southeast end.) This extension is wanted for services for the 1960 midsummer.

The portland cement concrete pavement for this extension was designed to these criteria: (1) smoother riding runways to increase the safety of the high-speed jet take-offs and landings; (2) reduced maintenance, to minimize interruption to air movements; and (3) encompassing the first two, a design for 100,000 lb. single wheel-load, at the lowest possible estimated long-run cost.

We resolved first to reduce the number of transverse joints (i.e., increase slab length) because we feel that the joint is one of the weakest parts of a pavement structure. Obviously, not only do fewer joints help attain a smoother runway, but also, they reduce the amount of maintenance required. Next, as further fulfillment of our self-imposed criteria, we resolved to attain control of cracking in the slab. (That is, we wanted assurance that any cracks formed in the slab between the joints be of the hair-line variety, and thus virtually non-existent.) Crack control, we felt, could be effected by the use of a distributed steel reinforce-



Workers are carefully placing concrete around transverse joint dowel assembly. Blaw-Knox spreader then strikes off first course. Other equipment on Gust K. Newberg, Hoyle-Newberg job includes two Koehring pavers, Blaw-Knox transverse finisher, Koehring longitudinal float, joint inserting machine, Heltzell buffer, Rex curing machine.

ment such as welded wire fabric.

Putting those resolves into effect, however, was not done as easily as writing them down in the foregoing paragraph. We still had criterion number 3 to meet—a superior design, at lowest possible cost. For example, we were convinced that wire fabric reinforcement would result in a slab that was structurally stronger, with tighter interlock of any incipient cracking, but economically, we couldn't justify fabric unless the slabs were lengthened. With longer slabs, there would be a consequent reduction in numbers of transverse dowel assemblies required, at a considerable dollar saving.

But, before we could go to a longer slab, we had to find a joint sealer with an extensibility of 150-200 percent, in order to assure constant unbroken sealing of the relatively wide opening. To this requirement was added, also, a need for a joint sealer that would be jet fuel and blast resistant, and require little maintenance.

After study into the experience of other designers and engineers in the joint sealer field, we heard about the use of two component polysulfide rubber on the Corps of Engineers' test trip at Sharonville, Ohio. Personal inspection of this test, corroborated by tests done by Portland Cement Association\*, led us to specify this material for the transverse contraction joints.

With the high extensibility of polysulfide (permitting wider contraction joints) we might feasibly have specified a 75-ft. long slab. As compared to a 25-ft. non-reinforced slab, this would have reduced joints by two-thirds, with a great saving in future maintenance; and certainly would have made for smoother rolling for the big jets. But this slab length would

have called for a welded wire fabric weighing about 96 lb. per 100 sq. ft. This fabric would be indicated in order to gain assured crack control and the structural strength required.

We, therefore, selected 50 ft. as a safe and economical slab length, and were able to specify 6 x 12-00/3 wire fabric weighing about 80 lb. as reinforcement. The halving of the number of joints (again as compared to a typical 25 ft. non-reinforced slab design) saved enough in dowel assemblies to minimize the cost of the steel fabric. Additionally, we were able to decrease the thickness of the concrete from its originally proposed 16 in. to 15 in., due to the increased load carrying capacity which the fabric imparts to the slab.

(As a matter of record, a further reduction of one or two inches in thickness due to the wire fabric might have been effected. But in view of the experience of the past, in which future loads always exceed estimates, we elected to remain on the safe side, and thus, with the crack control of the reinforcement, be better prepared for whatever comes in the jet age.)

\*Bulletin D-27, "Laboratory Tests of Sealers for Sawed Joints", by William Kuenning. Portland Cement Association, 22 W. Grand Avenue, Chicago, Illinois.

Placement of the welded wire fabric in the slab was specified as follows: six sheets, 17½ ft. long by 12½ ft. wide, to a 50 ft. long slab; with sheets lapped 17 in. at the ends, 6 in. at the edges (or centerline of the 25 ft. wide slab), and fastened at 4 ft. (or less) intervals, with 2 in. of clearance at joints, and 3 in. at side forms; the fabric to be placed at depth of ¾ in. down from the surface, between courses of concrete.

*Continued on page 90*





# **NOW! a Euclid 14-yd.\* scraper with all-wheel drive!**

## **TS-14 features that cut dirt moving costs**

2 engines — 296 total h.p.  
all-wheel drive  
NoSpin differentials  
2 Torqmatic Drives  
converter lock-up  
20 yds. heaped  
(14 yds. struck)



\*heaped capacity at 3:1 is 16 yds., at 1:1 slope, 20 yds.

HERE'S BIG NEWS for scraper users. The many cost cutting advantages of all-wheel drive are now available in a medium-size scraper, the Euclid Model TS-14. With Twin-Power and a total of 296 h.p. this new "Euc" has already proved itself an outstanding performer. A one-man, one-machine earthmoving spread, it gets more work done at lower cost than any other scraper of comparable size . . . its high productive capacity brings a better return on investment.

Like the widely used 24 yd. "Twin", this new Euclid has a separate Torqmatic Drive and power train for each axle. It self-loads in practically any scraper material and with a pusher is a big producer on even the toughest jobs. There's plenty of power and traction to pick up a heaped load in a hurry . . . pull out of the cut fast . . . and highball on the haul and return.

The TS-14 works on grades and under adverse job conditions that stall other scrapers. Its ability to do a wide range of work — without pusher assistance — makes it the most versatile scraper in its class. This new "Twin" can lengthen your work season and give you a bidding advantage on that next job. Get the facts and figures from your Euclid dealer. EUCLID Division of General Motors • Cleveland 17, Ohio

**Check the advantages of all-wheel drive  
in this new TS-14 Twin-Power Scraper!**



## **EUCLID EQUIPMENT**

FOR MOVING EARTH, ROCK, COAL AND ORE

Keep our roads on the GO



Steel construction offers adequate clearance and reduces height of approaches.



Mr. Harold S. Woodward, partner, Seelye, Stevenson, Value and Knecht, agrees that nothing is easier to design with than steel.



Mr. Williams D. Bailey, partner of the firm (left) supervises steel designs with his assistant, Mr. R. F. Shumaker (center), and Mr. Melvin Leonard.

Short-span steel bridge over the Connecticut Turnpike. Simple design saves engineering time and erection costs.



# Steel specified in over 95% of short-span bridge designs

at Seelye, Stevenson, Value & Knecht, Consulting Engineers, New York, N.Y.

The Bridge and Highway Division of this engineering firm deals almost exclusively in the design of short-span bridges from 100 to 125 feet long. In the past few years, the firm has designed bridges for the New York Thruway, the Connecticut Turnpike, and large projects in Ohio and Virginia. More than 95% of these bridge plans specify steel construction, according to Mr. Harold S. Woodward, partner in the firm.

*Reasons for favoring steel construction.* There is nothing easier to design with than steel . . . it takes only a fraction of the time for the designers to draw their plans, because considerably fewer mathematical calculations are required. If changes have to be made, it is relatively simple with steel design. With some other forms of construction, any changes may mean redesigning the entire structure—a costly waste of professional manpower.

*Steel is available.* This factor deserves serious consideration on any job. Steel is readily available and can be transported quickly and simply to the job.

*Steel goes up quickly.* Bridge spans must be constructed with least interference to traffic. The speed with which steel can be erected without normal traffic interruption is a big advantage.

*Steel permits maximum headroom*—also, minimum approach alteration. According to Mr. Williams Bailey, another partner in the firm, the use of slender steel beams keeps overpass approaches at a minimum in congested areas, and makes it possible to allow for tight clearances with minimum disturbance to established roads and buildings.

*Steel reduces costs.* Light construction with steel reduces foundation costs, and faster erection saves labor. New high-strength steels offer greater strength with even less bulk.

United States Steel and the steel industry in general have greatly *expanded facilities* for manufacture of structural shapes and plates. You can confidently design in steel—the material you know best, and the material that offers most—knowing it will be available.

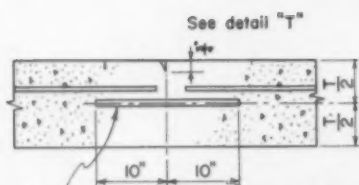
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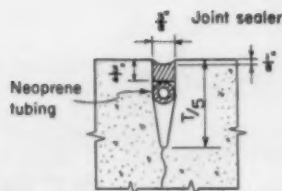
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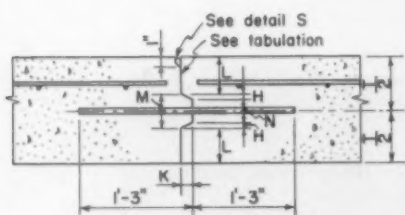
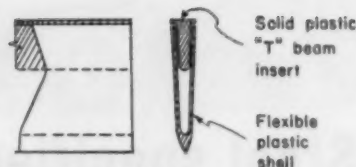


$1\frac{1}{2}$   $\phi$  x 1'-8" smooth dowels @ 15" ctrs.  
Dowels to be painted and greased

TRANSVERSE DUMMY GROOVE JOINT

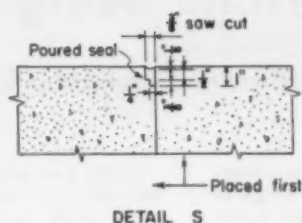


DETAIL "T" PRE-MOLDED PLASTIC JOINT FORMER (NOT TO SCALE)



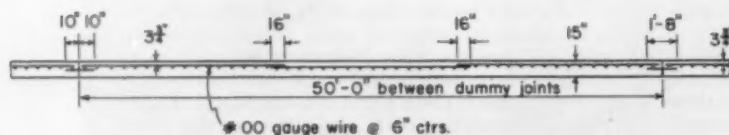
$\frac{3}{8}$   $\phi$  x 2'-6" deformed tie bars @ 2'-6" ctrs.

LONGITUDINAL CONSTRUCTION JOINT

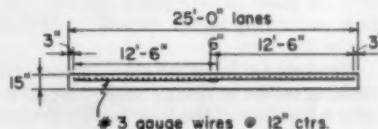


DETAIL S

Keyed Joint Tabulation					
Pavement Thickness	H	K	L	M	N
15"	$\frac{1}{2}$ "	$1\frac{1}{2}$ "	$5\frac{1}{4}$ "	$4\frac{1}{4}$ "	$3\frac{1}{2}$ "



LONGITUDINAL SECTION SHOWING FABRIC REINFORCEMENT



TRANSVERSE SECTION SHOWING REINFORCEMENT

Showing several of the five types of joints employed in the O'Hare Airport pavement design. Also dowel position and the welded wire fabric reinforcement sheets and their overlap.

## PAVING DESIGN FOR SUPER AIRPORT

*Continued from page 86*

Next was to take pains to see that the joints themselves are properly formed and sealed; and that effective load transfer between slabs maintained. For the latter purpose,  $1\frac{1}{4}$  in. diameter smooth dowels were specified, 1'8" long, on 15 in. centers across the slab width, and at the mid-thickness of the 15 in. thick slab.

One important construction detail is to make sure that the plane of weakness crack between slabs is formed at the mid-point of these dowels (not to one side or the other, as has sometimes occurred). We elected, hence, to preform the joint with a plastic V-shaped joint former, rather than specify sawing.

The advantages seen in preforming the joint with plastic inserts, rather than sawing, are: (1) No need to uncover the joint area during curing, with possible temperature loss and freezing of raw concrete such as might occur in early spring or late fall; (2) No need for strict time control; plastic preformers may be removed during regular shift, rather than on overtime; (3) Concrete is permitted to crack along plane of weakness at its own time; (4) Curing is uninterrupted. (Water in sawing process washes away curing compound, interrupts curing, causes need for replacement

of curing compound in and around joints; (5) Adhesive quality of joint sealer to concrete is not affected by plastic joint former (saw water affects this); (6) Plastic joint formers are reusable.

After reviewing the work at Dulles International Airport (Washington, D. C.) and other projects in which plastic joint formers were used, we elected to call for forming of the groove in the freshly placed concrete by a vibrating steel blade, rather than by vibrating the plastic insert itself directly into the mix. We felt that use of the metal blade would prevent aggregates from being vibrated away from the crack edge (an incipient source of weakness.) And this method is expected to permit truer alignment and seating of the plastic itself, with the concrete flowing back to the envelope to form a clean, straightedged joint.

After at least 24 hours, but after not more than 120 hours subsequent to placing the plastic preformer, we specified that it be removed and the joint sealed. (The plastic is easily pulled out by hand, the spreader strip inside the V-envelope coming out first, the envelope collapsing, and the entire strip coming cleanly from the 3 in. deep joint.)

Another important design detail was to obtain the



near ideal square shape factor for the joint sealer which contributes to increased extensibility\* (square in cross section across the joint, that is;—see sketch), we specified that a black, 1/2 in. diameter neoprene tubing be installed in the joint and pushed down in the slot to a depth of 3/4 in., across the entire slab width. The effect of this tubing is to cut off the bottom of the 3 in. deep V joint, and give to the joint sealer which is applied above it the desired square shape. And, important too, this should reduce the amount of joint sealer used, not an inexpensive material.

Mechanical application of the two-polysulfide joint sealer is specified, after mixing by strictly controlled mechanical means has been accomplished. The importance of this is to avoid any chance of air being entrapped in the seal, which, of course, is tightly packed above the neoprene tubing.

\*Again, see PCA Bulletin D-27

## Quick Facts on O'Hare Paving Program

### *Pavement Planned*

Additions to and extensions of runways, taxiways and apron areas.

To be completed in 1960 (under contract)—360,000 sq. yd. including 100,000 sq. yd. for extension of Runway 14R-32L)

To be awarded in 1960—Additional 950,000 sq. yd.

### *Notes on Specifications*

Granular Sub-Base Course 12 in. thick, consisting of coarse aggregates (retained on No. 4 sieve) and fines (passing No. 4) compacted through full depth to 97 percent maximum density at optimum moisture. Aggregates to be processed gravel, crushed stone or air-cooled, blast furnace slag.

Welded Wire Fabric—Must conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement" (ASTM A185).

Cement—Conform to ASTM Designation C-150; Alkali requirements, Table I, Federal spec. SS-C-192b; False set requirements, Table II, Federal spec. SS-C-192b.

Aggregates—Conform to ASTM Designation C-33 with modification.

Admixtures—Air entraining conform to ASTM C-260.

Accelerator—Flake or pellet type calcium chloride (AASHTO M-144) for temperatures under 40 deg., as approved by Engineer.

Water Reducing—essentially calcium lignosulfonate or adipic acid.

Curing—minimum of 7 days, protection against moisture loss, temperature change, rain, flowing water and mechanical injury.

### *Joint Construction Details*

Longitudinal Construction Joints (to maintain level of adjacent lanes) keyed joints formed between all

A grooving tool is used to remove excess sealer to a depth of 1/8 in. below the surface of the joint edges.

As a final indication of our concern with meeting the criteria established for the O'Hare pavement work, particularly that in reference to smoother riding, we have specified that in the future all longitudinal finishing of the pavement be accomplished with a combination finisher-float machine. This type of equipment, we feel, will help to achieve a superior riding surface. And, because the troweling plane of the machine is not supported by the side forms, it will result in a surface free of any transverse irregularities.

We in this organization, working with the complete and harmonious cooperation of Chicago's Department of Public Works and Department of Aviation, as well as the State of Illinois Department of Aeronautics, and the Federal Aviation Agency, are confident that the criteria established for the pavement design of the Chicago O'Hare International Airport have been met.

inside lanes, with 20 in. long, 5/8 in. diameter deformed tie bars on 30 in. centers, added at joints between inner lanes and the outer lanes. These joints are sawed to one inch depth, and sealed with joint filler material.

Expansion Joints—a 3/4 in. pre-formed joint filler material affords complete and uniform separation of pavement and structure an other feature which projects into or interrupts the pavement.

Transverse Contraction Joint Former—plastic envelope and T spreader was furnished by Sisalcraft; joint filler by Allied Jet Seal Co., Detroit, Michigan.

### *Contractors and Progress*

Paving of aprons and taxiways, grading and utilities—Consolidated Construction Company, Chicago, Illinois (Contract RB-3).

Paving sublet to Gust K. Newberg Construction Company and Hoyles-Newberg Construction Company (joint venture). About one-third completed in 1959.

Sawing of longitudinal joints, insertion of plastic formers for transverse joints, curing and scaling sublet to Barton Construction Company, Bloomington, Illinois.

Paving of extension to runway 14R-32L (Contract RB-7), S. J. Groves & Sons Co., Des Plaines, Ill. Grading done largely in 1959 autumn.

### *Key Personnel*

For the City of Chicago: William E. Downes, Jr., Commissioner of Aviation, overall responsibility for design; George L. DeMent, Commissioner of Public Works, overall responsibility for construction.

For Naess & Murphy—Architects-Engineers: Carter H. Manny, Jr., Project Manager; Walter G. Mettschke, Director of Engineering; Robert L. Novak, Assistant Director of Engineering; Harry L. Kagamaster, Chief Electrical Engineer.

# All-Out Modernization Transforms Jersey US 1

**Synchronized signals are part of a coordinated program for this jam-packed truck route**

**A**n example of an integrated program of channel, signal installation, modern lighting at key locations—plus widening, repaving and lane marking—is to be seen along New Jersey's congested US 1. This route—one of the nation's heaviest truck carriers—is jammed despite the relief afforded some years ago by the parallel New Jersey Turnpike. Threading as it does southward from the New York City area, it is part of the nation's prime highway traffic corridor.

Today a 36-mile segment of US 1, extending from Woodbridge south to the Trenton Traffic Circle, is under a single synchronized traffic signal network—possibly the nation's longest such control system. This system includes 30 locations where signals regulate traffic in conjunction with "jug-handle" turn areas, built in lieu of costly overpasses. Fluorescent illumination at these intersections, and incandescent lights at other locations, were also included along with the signals in a \$126,000 contract executed late in 1959 by Casey Electric Co., of Clifton, N. J.

As a result of this installation, the motorist or truck driver now can travel the full 36 miles without encountering a single red light.

Motorists awaiting crossing from intersecting side roads activate the traffic signal by running over a detector in the pavement—following which the light turns green when the interval arrives which coordinates with the Route 1 staggered system. No side-road motorist, no interruption on US 1 flow.

Along with this control, the state's 52-in.-high standard concrete median separator has been installed extensively along US 1. The medians are built in conjunction with continuous provision of two 27-ft. roadways in either direction, plus 10 ft. surfaced shoulders. Asphalt concrete resurface was followed quickly by the line striping crews to provide the final safety element.

The median barriers, alone, reportedly have cut certain accident types (head-on collisions) nearly 100 percent. The total effort has cut accident rates on this road to a fraction of the former rate.

As further progressive improvement, a main arterial at East Brunswick will soon be carried over US 1 via a complete interchange, with another cloverleaf planned for Mil-town Road junction.

Urban Route Signalization. The US 1 program, which is being extended, is part of a state-wide ef-

fort to make the most of modern signalization on New Jersey's 1,840-mile state highway system. Because of the high degree of urbanization, the state works closely with city and county authorities on urban route segments.

The crux of the problem is to make sure that each signal installation permits easiest traffic movement while preserving the added safety to motorists that the signals afford.

Signals are located at 927 points on the state system (one for every 2 miles). Others are being installed at 60 new locations, and requests for additional signals are coming into the department at a rate of about three a week.

Since 1955 the decision as to whether and where to put signals on the state system has rested with the state highway department. With this decision the department has the responsibility of determining the design, position, timing, and any physical modification of the intersection which may be required, and furnishing and installing the signals and controls.

This responsibility requires at least two departmental bureaus, sometimes four. Where a simple intersection is involved, the Bureau

### **New Centerline Barrier Curb**

New Jersey's massive new concrete divider is shown here on a segment of US 1, combined with new widened and resurfaced roadway. Lane stripes, a further safety element, not yet added.



### **'Jug Handles' at Many Crossings**

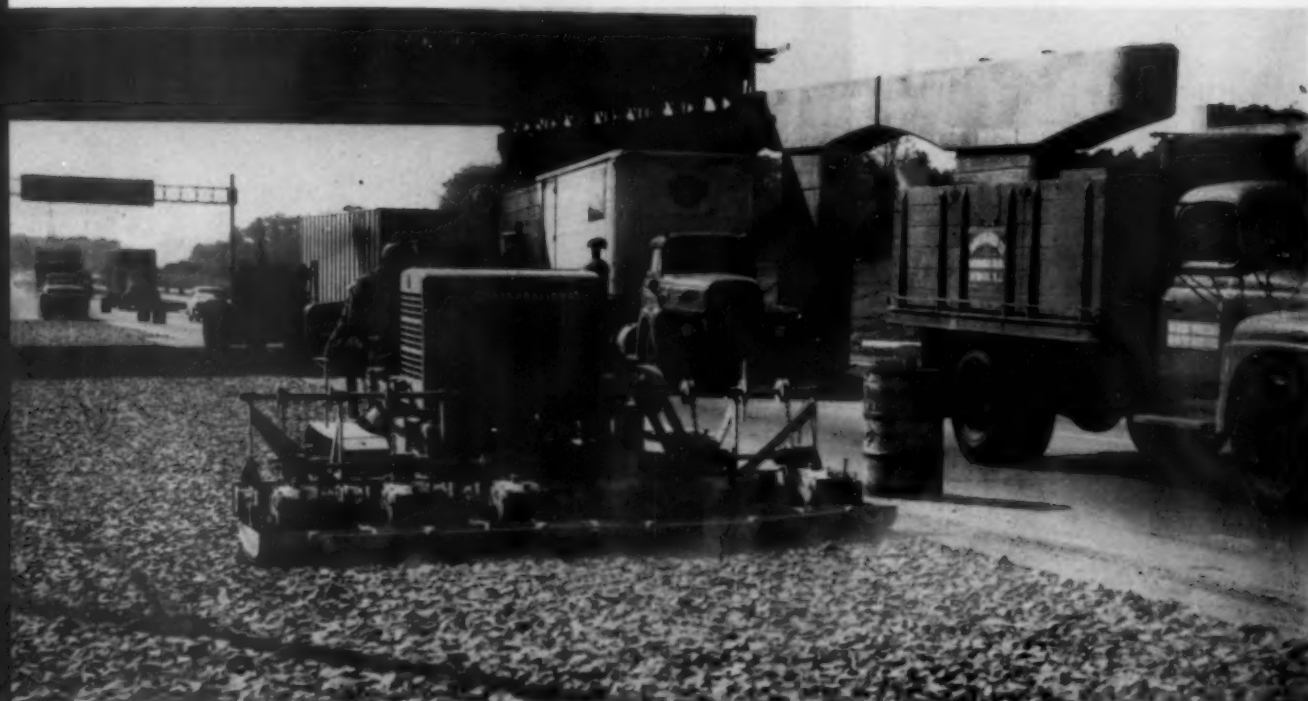
These effective left-turn eliminators have been constructed at numerous intersections of US 1 and side roads, as a means of reducing the accident rate and improving the total public service.



### **Signal Network, Modern Lighting**

At jug-handle intersections and elsewhere, signals have been installed with timing for progressive flow along US 1 and provisions for flashing green on cross-over traffic demand. Fluorescent lights are part of the safety scheme.





Widening in progress on US 1 near an important interchange, new lanes being added in conjunction with an overpass project. Note the extremely heavy truck traffic.

of Planning and Traffic conducts the necessary studies, and makes recommendations to the commissioner as to whether or not a light is warranted. If the installation is to be made, the same bureau then designs the layout for the signals and determines the timing. The Bureau of Electrical Operations follows through with the wiring details and in most instances handles actual field installation of the signals.

If the intersection itself must be changed, the department's Bureau of Road Location and Design is called in. This re-design usually takes the form of a channelization in which islands that separate and channelize traffic are located on scale drawings by design engineers. These plans are converted into finished field products by either the department's Bureau of Road Construction or the Bureau of Maintenance Operations.

Several factors obviously enter into the installation of traffic signals: safety to motorists and pedestrians, traffic flow, and citizens' time, and money. Hence the deci-

sion as to whether a signal is actually required, cannot be arrived at lightly. News releases to the press have repeatedly stressed this point. The many requests for signal installations are combed thoroughly in the light of actual need, even before the factor of limited funds and available manpower can be applied in establishing a priority for necessary installations.

In most instances, the first step leading toward erection of a traffic signal is a request from a municipality. Repeated accidents, interruption of the free flow of traffic, or difficulty of pedestrians crossing at intersections often prompt a local government to move for a traffic signal at a given location. The highway department evaluates information submitted with the request. Then it begins systematic on-the-spot study of the intersection to determine if conditions indicate the need for a signal.

These studies involve complete traffic counts at various times of the day, taking into account pedestrian traffic and the physical characteristics of the intersection. The

studies are continued until the data obtained represent a well-rounded and impartial appraisal of the intersection conditions. Once the data have been analyzed, the department compares it to pre-determined requirements listed in the "Manual on Uniform Traffic Control Devices" of the Bureau of Public Roads.

This manual, known as the "Bible" of traffic planning, lists the following six basic intersection situations, any of which may warrant the installation of a traffic signal.

1. Accident History—If five accidents, correctable by a traffic signal, have occurred each year over a 5-year period.

2. Vehicle Volume—If at an urban intersection 750 cars per lane per hour pass through for eight continuous hours, 250 of which are approaching the intersection from the cross street.

3. Traffic Interruption—If there are 750 cars per hour for eight continuous hours, traveling at least 35 mph, with 75 cars or pedestrians

*Continued on page 99*





## ROAD REPAIRS

### ...are cut to a minimum when you treat gravel roads with Sterling Rock Salt!

Now many highway departments can cut down on spring repairs of gravel roads. Simply by treating these roads with economical Sterling Rock Salt, these departments can reduce surface breakup and aggregate loss. Because salt-treated roads stand up so well through hard winters and heavy traffic, the only maintenance needed in most cases is routine blading in the spring.

Special equipment is no longer required for effective salt treatment of gravel roads. (Any highway department should have the equipment needed.)

Last year, International Salt Company introduced a simple, practical method which is fully described in a free booklet, "Better Roads." Send today for your free copy and learn how Sterling Rock Salt treatment can work in your area.

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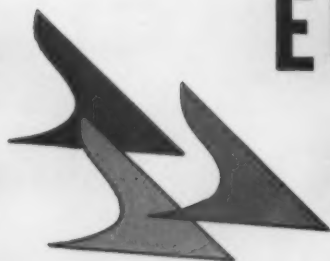
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# EUCLID'S GREATER DIMENSION



Model C-6 is powered by a dependable GM 6-71 engine; delivers 211 net h.p. to power train... proven Torqmatic Drive provides full-power shift and fast response... almost unbelievable ease of handling... fast-as-a-fox maneuverability... fine visibility... exceptional balance with heavy duty attachments... accessibility for servicing that results in more productive time on the job.

The C-6 has the speed, power and maneuverability to handle every kind of tractor job... ripping, dozing, push loading, clearing, towing and other heavy work. Many major components including Torqmatic Drive, engine, and planetary drive axle have been job proved in thousands of Euclid earth-movers. Owners say that full-power shift, easy operation and fast response give the C-6 more work-ability than any other crawler in the 200 h.p. class.



**Facts and figures on the Model C-6 and Model TC-12 "Eucs" are available from the Euclid dealer in your area... get in touch with him soon!**



Greater Dimension in power and performance... TC-12 has 2 engines that deliver a total of 425 net h.p. ... independent track drive with separate power train and Torqmatic Drive for each track... full-power shift and instantaneous reverse... 8 track rollers... unequalled accessibility for servicing... maneuverability and workability that have set new standards of big tractor performance.

Proven Torqmatic Drives deliver a smooth flow of power to each track... with full-power shift there's no delay for clutching and shifting... change direction with a flick of the wrist... 425 total net h.p. is automatically matched to every job requirement... rigid track alignment maintained by independently suspended track frames and final drives... years-ahead engineering reduces downtime and maintenance costs for a better return on investment.

**Crawlers without full-power shift are obsolete... and costly!**



## EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



## IN MODERN CRAWLER DESIGN

With over twenty-five years of experience in building heavy earth-moving equipment exclusively, Euclid offers a greater range of types and capacities, a greater background of field experience, and a greater return on your equipment investment.

One example of this greater dimension was the introduction of the Model TC-12 Crawler over 5 years ago. Here was an entirely new concept of tractor design . . . two engines, each driving a separate track through its own Torqmatic Drive . . . unequalled power and work-ability . . . performance that set a new standard of crawler productivity . . . ease of operation and servicing that is still unsurpassed in the industry.

Recently the Model C-6 Euclid tractor went into production after the most comprehensive field trials and proving ground testing ever given any new Euclid model. It, too, has Torqmatic Drive and full-power shift as well as many of the advanced design features of the bigger TC-12. And like the "Twin", the new C-6 utilizes major components that have been job proved in thousands of "Eucs" in construction, mine and quarry service. For instance, the Allison converter and semi-automatic transmission "package" has long since passed the pioneering and development stage . . . it's been used in "Euc" scrapers, rear-dump haulers and other models for years. These two Euclid crawlers provide so much more work-ability that they obsolete tractors without the operating advantages of full-power shift.

**EUCLID Division of General Motors • Cleveland 17, Ohio**

## news and notes from the field

### Overcoming the Problems of Hot Weather Concreting

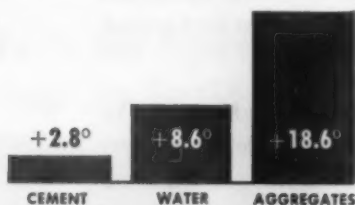
Hot weather can be made to work for you in concreting—if certain precautions are observed during placing. The dangers of inadequate preparation before placing, high MIX temperatures and poor curing protection should be understood and controlled.

#### Effects of High Temperatures

High temperature accelerates the setting time of concrete and promotes rapid evaporation of moisture. The setting time is based on mix and curing temperatures of 73°F. As the temperature rises the setting time accelerates. When the temperature of the concrete is allowed to climb too high, there is danger of "quick set" and permanent strength damage.

#### What causes High Concrete Temperatures?

The temperature of fresh concrete is affected by the temperature of the materials and the mixing conditions. Take an average five bag mix and increase the temperature of each ingredient 30°. The graph below shows how much each affects the concrete temperature.



#### What Happens When Temperature of Fresh Concrete Runs Too High

- Permanent strength reduction
- Early stiffening or quick set
- Increased water requirements
- Increased probability of cracking

#### Reprints Available

If you would like free reprints of this helpful information on Hot Weather Concreting, contact your local Alpha representative or the Alpha Portland Cement Company, Easton, Pa.

#### Ways of Reducing Mix Temperature:

1. Sprinkle hot aggregate stock piles with hose or fog spray.
2. Apply fog spray to aggregates or conveyor belts.
3. Use crushed ice in the mix replacing water—pound for pound.
4. Avoid stock-piling aggregates directly in the sun.
5. Protect mix-water storage and lines from direct sun.
6. Avoid the use of strength accelerators in hot weather.

#### Tips For Best Results



1. Subgrade should be damp (not muddy) so it will not absorb water from concrete.



2. Have adequate help available to handle concrete rapidly.

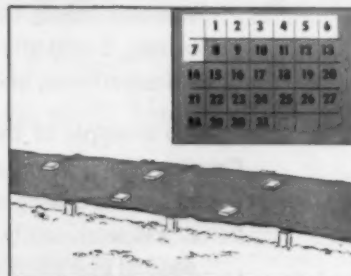
3. Discharge MIX as soon as possible after proper mixing.

4. In extremely hot weather it may be necessary to shade concrete or use wet coverings until final finishing can be completed.



5. In hot dry breeze erect wind break or use fog nozzles on upwind side of fresh concrete.

6. Start curing operations as soon as concrete has set enough to avoid surface damage.



7. Cure concrete for at least 7 days where durable wearing surface and strength are important.

8. Keep test cylinders shaded and damp until they are ready to be sent to laboratory after 24 hours.

**ALPHA**  
PORTLAND CEMENT COMPANY  
Alpha Building, Easton, Pa.



## NEW JERSEY'S US 1

*Continued from page 94*

per hour approaching from the cross street.

4. Pedestrian Traffic—If there are 250 pedestrians per hour for eight continuous hours trying to cross the main street on which 600 cars per lane per hour for the same period are traveling at least 30 mph.

5. Speed Control—If there is a need or substantiated desire to control the speed of vehicles on the main street.

6. Combination—If highway department studies show that no signal is called for under the first four sections, but that in two or more of them the requirement is almost met.

Since leeway is granted under No. 6, the highway department engineers assigned to study the desirability of a traffic signal use their experience and discretion in deciding if a combination of factors warrants the installation.

Actual construction of the signal system involves much more than a lineman or two climbing ladders, the public is reminded. Besides the erection of the poles, masts, and light machinery, a great deal of underground electrical work is required. Often days elapse between the construction of the signal equipment above the road and the first time the current is turned on.

The automatic operation of a traffic signal has continued to mystify some motorists and pedestrians, notes a department spokesman. Today, nearly every installation on the New Jersey's highly urbanized state highway system employs detectors embedded in the roadway of the cross street. Nearly half employ pedestrian push buttons.

Signals are on either a "coordinated" or a "floating" system. A "coordinated" system (again explaining to the public and to local officials) simply means that a rotating clock mechanism divides the time between highway green and cross-road (or cross-walk) green into regular segments. For example, the clock may be set for 45 seconds of green to the highway and 15 to the cross-road. There is no possibility of the light turning green to the sideroad until that 15 second interval comes around on the clock.

And then, it will not turn green unless the detector or push button has been depressed.

The state constantly explains the advantages to motorists of the "coordinated" system, which center on the steady, non-stop travel it permits. Long distances may be covered without stopping for a red light, or limiting the ability of drivers on side roads to cross or enter the main highway. For example, on Route 71 through Asbury Park, Neptune, Bradley Beach and Belmar, the 27 signal installations here are coordinated to permit motorist non-stop travel through that 8-mile stretch.

The explanation goes on to note how the "floating" system differs from the "coordinated" system. "Floating" does not depend on a pre-set cycle, but rather on a guarantee of green time to the highway. Activating the switch on the side road will turn the light green at any time, immediately—so long as there

has been a pre-designated green period to the highway. If that period is set at 30 seconds, for example, the switch will immediately turn the light green to the side road, or pedestrian, when the light has been green to the highway for at least 30 seconds.

Traffic signal costs on the New Jersey state system, which include installation, maintenance, and charges for electricity, are often shared by the state and a municipality or county. If the signal is installed at the intersection of two state highways, the state pays all costs. If a municipal or county road (or special pedestrian walk) crosses a state highway, the state pays 75 percent of the installation, all the maintenance, but none of the electricity charges. The same applies to a municipal or county road which joins, but does not cross, a state highway, except that the state then pays 85 percent of installation.

Plant or business entrance signals on state highways, when approved, are paid for by the plant. It also pays all electric bills and a flat \$200 per year to the highway department, which performs maintenance.

Most signal installations on the state highway system are inspected at 2-week intervals. All locations are checked at least once a month. Several crews, each operating a "ladder truck," perform this duty and are also available for emergency calls at any time, day or night. Each installation is checked for its timing. If it is off, the crew re-sets it and determines and corrects the reason for the error. The physical condition of all the parts is checked, and all signal lights are checked to see if they are aimed properly.

In addition, the department replaces all signal lamps every 9 to 12 months. This action avoids many possible instances of emergency calls over burned-out lamps.

Due to the constant increase in traffic volumes, new signal systems will be installed in substantial quantity each year. Installations could well represent a flagrant waste of effort and funds unless a reasonable yardstick is consistently employed. By utilizing nationally accepted standards and practices, the New Jersey state engineers feel certain they are handling vital service in the best public interest.

### Effective Leaflets for Informing Public

The New Jersey state highway department's public information wing has issued a series of printed folders, each explaining an aspect of the highway program that particularly concerns the citizen.

The subjects include: "Traffic Signals", "Highway Signs", "V Center Barriers", "Speed Zones", "Jug Handle Turns", "Right of Way", "Creeper Lanes", and "New Jersey's Highway Needs", and new topics are added from time to time.

Each folder is printed with a picture-less layout of utmost simplicity. The information is presented on the assumption that many motorists and enquirers sincerely desire to be better informed, and are capable of understanding a non-technical explanation of the reasons for some of the state's highway design features, policies and traffic regulations.

The folders are enclosed as letter attachments in day-to-day correspondence, sent out to newspaper editors, and distributed at hearings and in other ways as opportunity presents.

## Engineer Sees Need For Vigilant Control of Contractors

**C**ontractors have asked for end-result specifications and more freedom to run their jobs in many states. But they still require vigilant control, some highway officials feel. One such official is a New York state department of public works district engineer, R. W. Sweet of Watertown. He "put it bluntly on the line" on the problem of job quality control, speaking during one of the Construction Committee sessions at the Boston AASHTO meeting.

Rather than chide contractors, he made it plain that their need for production is their driving goal—and that the field and inspector are the focal point in the state highway department's effort to give the public good road construction for its money.

Contractors as well as engineers in the states will see sense in Mr. Sweet's remarks, excerpted here:

• • •

In this era of machine production we seem at times to have lost a thing called "pride of workmanship." We are not alone in this. It is true of practically all industry today. Indifference toward results has, to some extent, infected our engineers and inspectors. Of course, some of our difficulties are due to inexperienced construction inspectors. Like many highway depart-

ments, New York state's hired no new engineers from 1930 to 1945, the years of the Depression and World War II. As the work-wise old timers retire, we are forced to shove inexperienced youngsters into their places—and this at a time when the speed and volume of road building are at an all-time high.

We have tried to fill the gap with consultant forces, with spotty results. The consultant firms have no more success than we do in producing competent, honest inspectors. These firms do not have the large backlog of experience in road design and construction that our career employees possess.

Nonetheless, in my opinion, we must use the consultants, otherwise our construction jobs will be inadequately covered. Several consultant firms have, despite difficulties, developed highly efficient inspection staffs. Under the control and instructions of one of our top career men, consultant supervision can be efficient and effective.

Good construction control then becomes a matter of good administration. If the administrator demands good, tough, intelligent inspection he will get it. Of course, he has to really mean it. The man out on the job has to be confident that he will be backed up by the front office if he locks horns with one of these high speed, hard nosed contracting outfits.

Maybe some of us have come so far in this business that we have forgotten the problems and fears that beset the young fellow who is charged with keeping a construction operation straight. Let him know what you want and that you will stand back of his efforts to get it for you. Sometimes we make a glorified bookkeeper out of him by saddling him with useless reports to fill out. It is just good administration to instruct every man of his area of duty and responsibility.

Let there be no overlapping of responsibility or vagueness of objectives. An inspector should know what results he is expected to produce and what expedients he can use to insure the contractor's compliance.

Contracting mechanization has reached to the point where the cost of a road building outfit runs into a very substantial investment. The big companies have experts to estimate their costs, and compute their bids. Seldom does the same man supervise the construction. On desirable jobs, the bidding is usually close and savage with not much cushion left for unexpected difficulty.

All that puts the contractor's superintendent in a tight spot. The only way he can show a profit is by continuous, high-volume production. He is in the position where his big machines are driving him,

rather than he driving them. With the head-office accountants analyzing his reports, he would be less than human if he didn't take now and then—well, let's call it a calculated risk—of lowering quality safeguards as much as he can in favor of high production.

Sometimes culvert or sewer backfills are slighted, which produce settlements and embarrassing pavement failure a couple of years after the road is completed.

Other things are likely to be sacrificed for production: proper compaction, proper drainage during construction, good fine grading, good pavement finishing, selective clearing, respect for the rights of abutting property owners, proper and courteous maintenance of traffic—in fact, all the myriad details that make the difference between a really good road and one that is just barely acceptable.

Our defense against these practices is, of course, good inspection. The engineer in charge of a major roadbuilding contract is really an important figure. Ideally, he needs to be a well-trained engineer, an able administrator, a public relations expert, a teacher and trainer and something of a hero. It takes more than a little courage to stand up to the hard-bitten, driving superintendents and foremen who direct the big construction jobs.

Your engineer in charge needs to know that he has the solid backing of his superiors. Then he can meet his problems unhampered by fear of having his orders rescinded.

He and his inspectors must have thorough knowledge of the specifications they are there to enforce, not only the "how" but the "why" of those specs. No contractor should be left in doubt about what he is required to do.

Frequent conferences between the superintendent and the engineer and insistence on strict adherence to a schedule of operations will tend to eliminate friction and misunderstanding.

Then there is another solid and very practical reason for good inspection: our maintenance engineers will tell you that maintenance costs start the day construction is finished. Poor construction invariably results in high repair cost. Our simple duty to the taxpayers who foot the bills is to get them their money's worth.



Four flat cars needed to carry this 190' 10" girder, destined for the Throgs Neck Bridge approach structure.

## Longest Rail-Shipped Girders

The first of eight fabricated steel girders, each 190 ft. 10 in. long, the longest ever shipped from Bethlehem Steel Company's Pottstown, Pa., works, and believed to be the longest ever shipped by rail anywhere, was loaded onto railroad flat cars for transportation to the Throgs Neck Bridge site, in Queens, New York. There they will be erected by Bethlehem Steel ironworkers into the first four over-water spans leading from the Queens

end of the suspension bridge to the approaches. The 125-ton girders, 12' 8½" deep, are built up of a web plate 9/16 in. thick and 12 ft. wide and chord angles 8" x 8" x 7/8" and 6" x 6" x 7/8", with 3/8" in. thick side plates, all shop riveted.

Each girder is loaded onto two carrier cars with two idler cars in between. The longest girders previously ever shipped from Pottstown were 179 ft. long.



Helicopters bringing the contractor over his job for a quick inspection.



F. Francis D'Addario, president of D'Addario Services, is seen in the company helicopter.

## Helicopters Help Job Management

**H**elicopters are finding growing use by contractors in job management. You see them expediting site reconnaissance, inspection, inter-project travel, transport of tools, supplies and personnel, and for general supervision. These whirleybirds, in helping the boss stay on top of his job, are in fact threatening to create a whole new way of doing business, one enthusiast predicts.

For one thing, the helicopter often can help a construction man get more business, by enabling him to make a closer estimate for bidding purposes. The machine's unique ability to fly low and slow, and to stop and hover, permits a view of the construction area impossible by any other means. The contractor may be able to spot the nearest clearing, where equipment

can be taken in, select the major haul road routes, discover special terrain difficulties, and map tentative strategy—all from one quick flight.

These winged rigs, to continue, can put key men where they're needed in minutes, thus help keep equipment and workmen better utilized. They bring in needed parts, equipment or troubleshooters to shorten costly work delays. The helicopter, whether a Bell or Sikorsky, Hiller, Brantly or other manufacture, is of special value to the contractor who has several jobs going and must maintain a tight time schedule on his equipment assignments.

Better coordination alone often eventually repays the investment cost of the helicopter, again to quote an enthusiast. The savings to

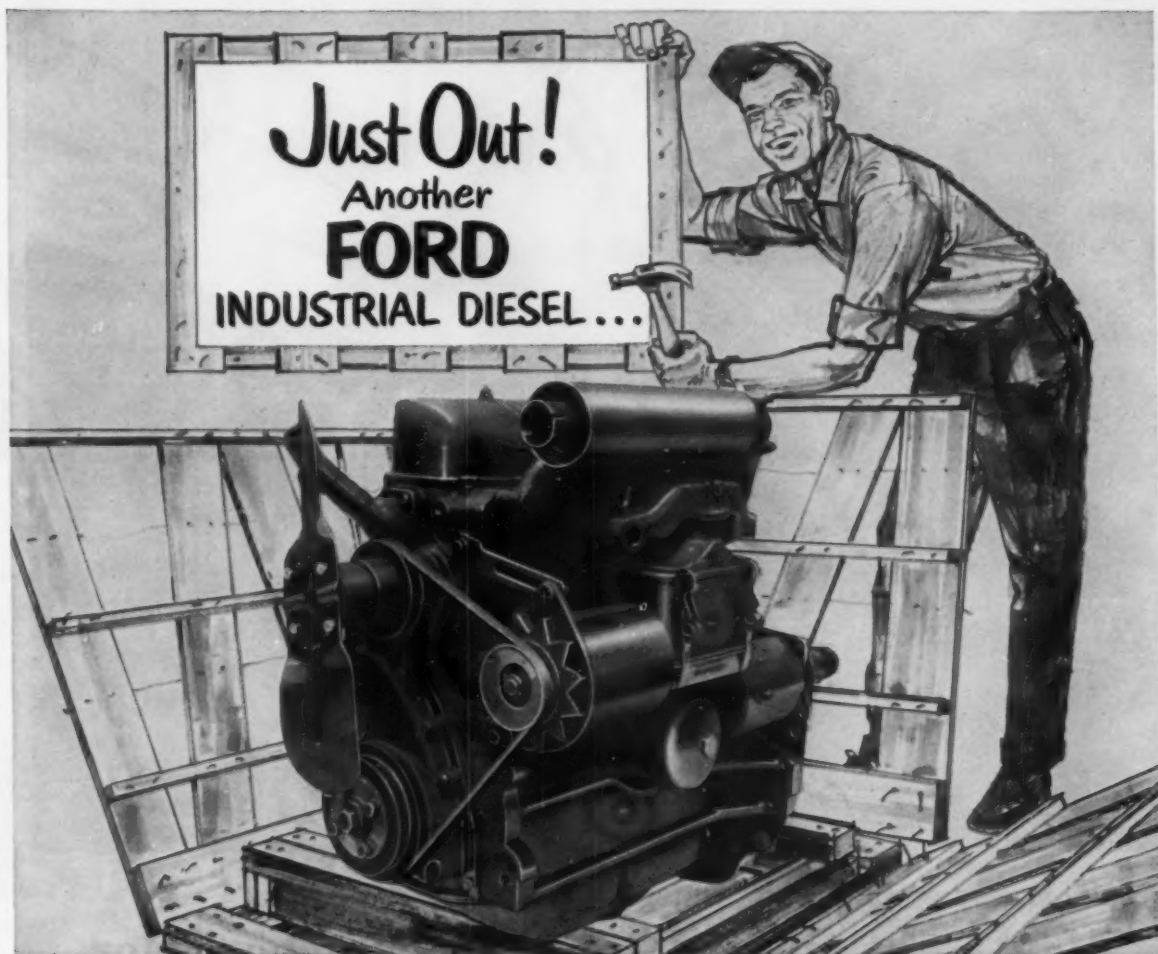
the contractor, personally, not just in time but of the enervating hours behind the wheel, is incalculable. All in all, one owner reports, a helicopter can be the most active piece of equipment on the contractor's payroll and the least expensive, figuring advantages against ownership costs.

Here are a few examples:

(1) Angelo Tomasso, Inc., general contractors, of New Britain, Connecticut, which does a variety of construction including road work, asphalt paving and aggregate production, has used a helicopter with reported success. R. B. Futtner, manager, aviation department of Angelo Tomasso, Inc., told *Roads and Streets*:

*Continued on page 107*





## FORD PRESENTS THE 172<sup>CUBIC</sup> INCH DIESEL FOUR !

(and it's interchangeable with the 172-cu. in. gasoline engine)

To meet the growing demand for diesel power, Ford now offers a choice of three economical diesels—the highly efficient 172-, 220- and 330-cubic inch models.

Whichever you select, you'll be getting a completely modern diesel that delivers the high torque necessary to handle tough jobs with outstanding operating economy and easy, low-cost maintenance.

Ford Diesels also offer dependable 12-volt electrical systems for quick starting . . . replaceable cylinder sleeves that eliminate costly reboring . . . and rotating exhaust valves for better seating, longer valve life.

What's more, Ford's 172 Diesel and 172 Gasoline engines are *interchangeable* in your equipment. Many parts, too, are interchangeable between these engines. And low-cost Ford parts and service are always available at any nearby Ford Power or Tractor Dealer.

For greater productivity and more profit in the long run, it will pay you to check the 172 model or other Ford Diesels at your Ford Industrial Products Headquarters.

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West of Rockies write to:

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ENGINE SERIES		172 FOUR DIESEL	220 FOUR DIESEL	330 SIX DIESEL
Basic Model		DD	X	Y
Type		4-Cyl. O.H. Valve	4-Cyl. Diesel	6-Cyl. Diesel
Bore and Stroke—Inches		3.9 x 3.6	3.94 x 4.52	3.94 x 4.52
Displacement—Cubic Inches		172	220	330
Brake Horsepower	Dynamometer	59 @ 2400	60 @ 2250	96 @ 2250
	80% Dyn. BHP	47 @ 2400	48 @ 2250	77 @ 2250
Torque	Dynamometer	140#' @ 1200	151#' @ 1600	236#' @ 1600
	80% Dyn. BHP	112#' @ 1200	121#' @ 1600	189#' @ 1600
Compression Ratio		16.5 to 1	16 to 1	16 to 1

. . . for more details circle 305 on enclosed return postal card



Despite acid fumes and Ohio winter...

## **M50® paint applied in Spring matches color of M50 paint applied previous Fall**

One of the many outstanding properties observed during National Lead exposure tests of M50® basic lead silico chromate pigment paints was a remarkable resistance to fading. The practical value of this property is brought out by an event in the repainting of The Harvard-Dennison Bridge in Cleveland, Ohio.

At the close of the 1958 painting season, this repainting had been only partly completed. In Cleveland, that Winter was particularly hard on paint... periods of heavy precipitation and cold alternating with warm, sunny days. And... notice the smoke in the picture above... this particular bridge lies in the direct path of acid fumes from the stacks of a nearby chemical plant.

Despite all this, when the contractor began to paint again in the Spring, no color difference could be detected at the boundary between the previously applied M50 paint film and the new.

What makes this color retention so remarkable is that it is obtained in

... for more details circle 344 on enclosed return postal card

a finish paint that also provides the rust inhibition of a standard primer. Only paints made with basic lead silico chromate pigment combine the anti-corrosion action of a primer with the weather resistance, durability and tintability of a finish paint.

**Now, for the first time...**


Paint suppliers are providing states, counties and municipalities with true "Defense-in-Depth" against corrosion... paint systems with an active rust inhibitor, basic lead silico chromate, in all coats, primer, intermediate and finish. If you are not yet acquainted with these modern paints, ask your regular suppliers about them. They're setting new standards for durable metal protection.



Applying M50 alkyd primer coat over commercially sand-blasted surface.



Grey M50 alkyd finish coat goes on with complete color uniformity.

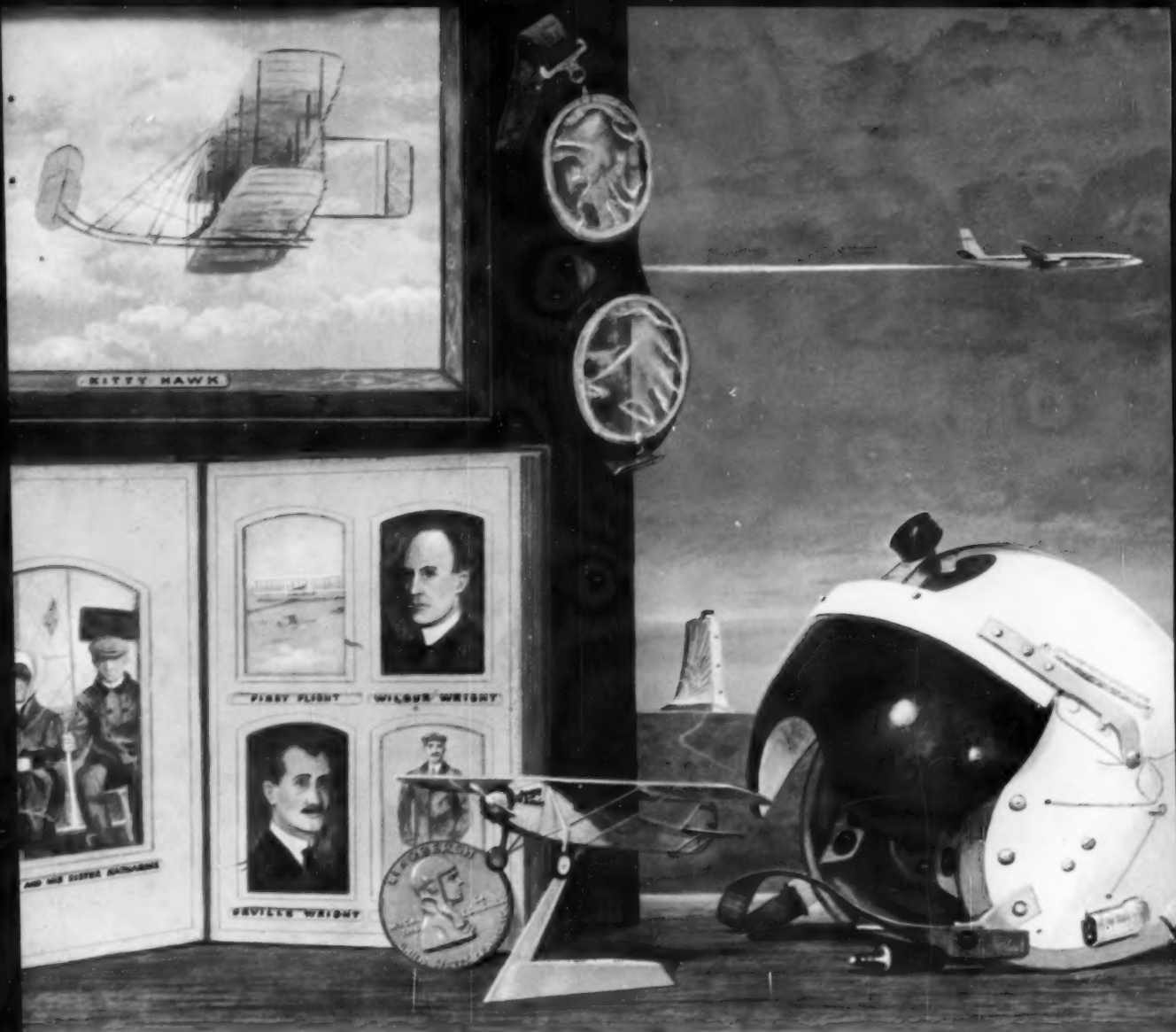
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**National Lead Company**

General Offices: 111 Broadway, New York 6, N.Y.

ROADS AND STREETS, June, 1960



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TRACTOR SHOVELS  
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TROJAN TRACTOR SHOVELS ARE AVAILABLE IN 8 MODELS, LIFTING CAPACITIES FROM 6,000 TO 24,000 LBS.

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• BATAVIA, NEW YORK

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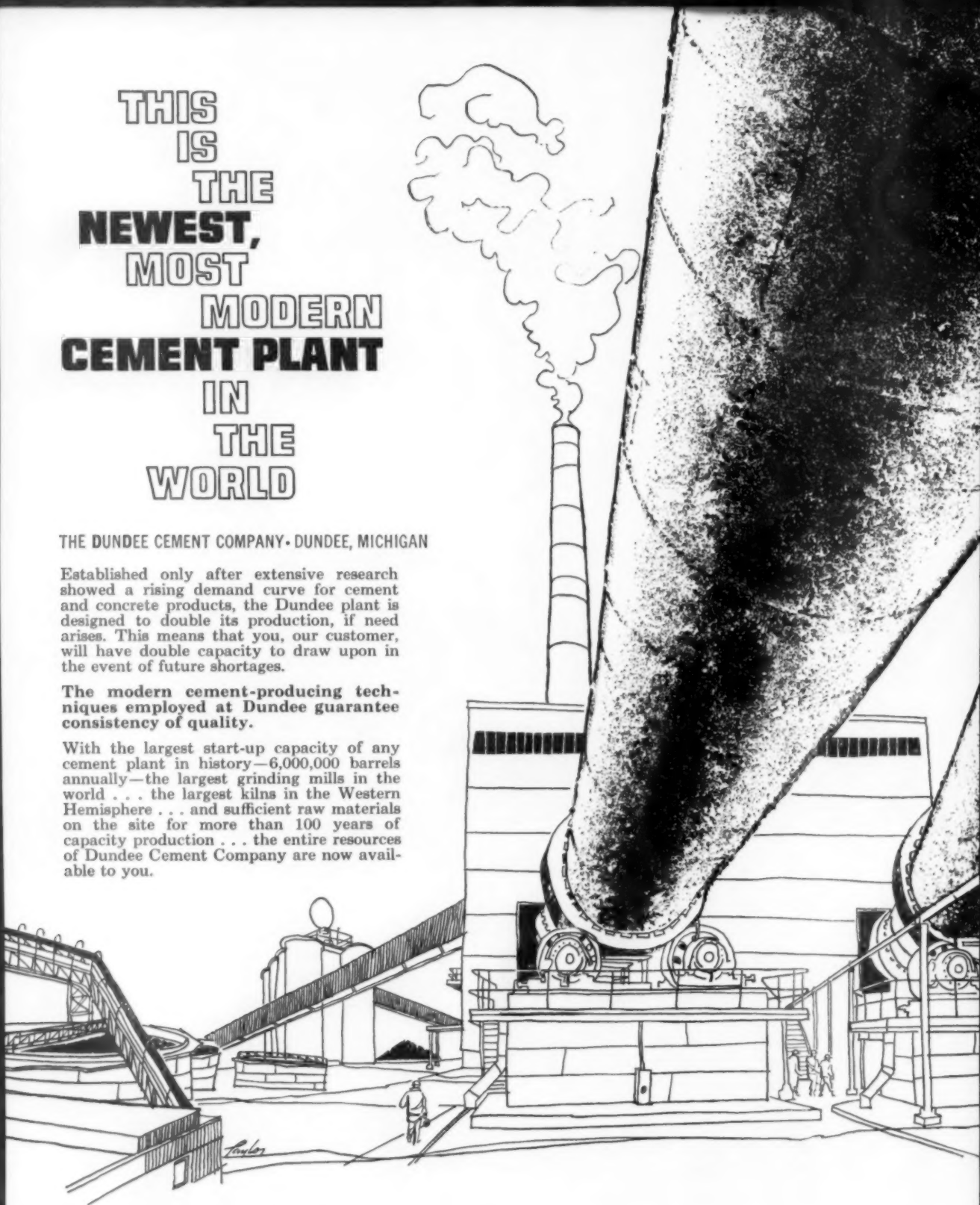
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The modern cement-producing techniques employed at Dundee guarantee consistency of quality.

With the largest start-up capacity of any cement plant in history—6,000,000 barrels annually—the largest grinding mills in the world . . . the largest kilns in the Western Hemisphere . . . and sufficient raw materials on the site for more than 100 years of capacity production . . . the entire resources of Dundee Cement Company are now available to you.



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CEMENT COMPANY

DUNDEE, MICHIGAN

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Survey and progress report work is an important function of the helicopter during highway and road work.



Lands anywhere — The new Sikorsky S-62, first amphibious helicopter with a flying boat type hull suitable for operating from water, land, ice, snow or swamp, may find varied industrial use.



## HELICOPTERS

*Continued from page 102*

"Our helicopter has played an important role throughout the entire scope of our operation—and we are not only general contractors, including road and highway work, but also the largest independent asphalt producer in New England. Our helicopter has cut ground travel time for top executive personnel by at least 50 percent. "To be specific," continued Futtner, "the machine frequently transports superintendents and foremen to jobs. It can rush a needed mechanic, bring quick aid to a hurt man, and transport company officials from the quarry, to gravel pit, to road sites. We can tie our oper-

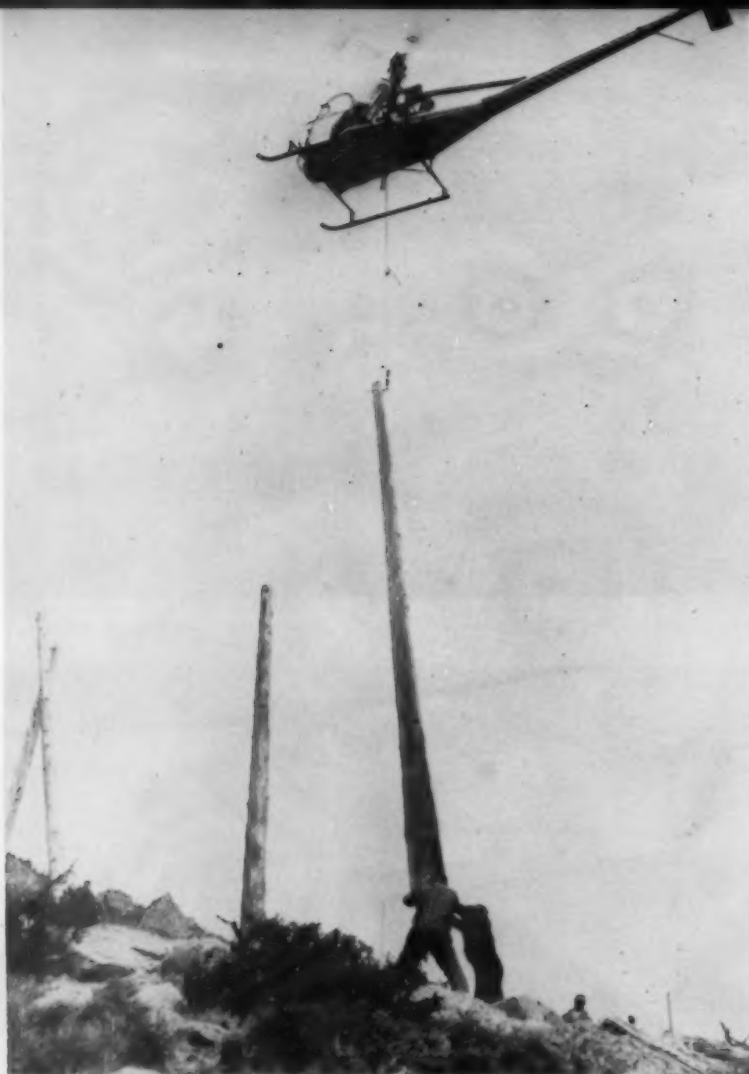
ations closer together and keep a valuable overall view of our progress rate."

As to providing emergency parts, this spokesman cited the supplying of a supercharger to a D9 Caterpillar, a high-pressure hydraulic line to a Euclid TS-24 earthmover, and a bearing for a Bucyrus-Erie 71B shovel. "All these, and many other parts, have been flown to our operating sites, thereby eliminating many hours of down time which normally, using surface transportation, would have been inevitable."

Angelo Tomasso, Inc., took over two years to investigate helicopters before acquiring one. "I would caution the contractor who thinks that he can just buy this piece of

equipment and add it to his tool shed," said Futtner. "Without due regard for proper care and maintenance, which can only be done right by top qualified personnel, the helicopter could become a liability instead of an asset. Its purchase is a serious step, deserving thorough consideration."

This firm's machine is a Bell 47 G-2. A special cargo kit, 63" x 15" x 21" has been installed on the crossbar for housing suitcases, tools, and other items. The firm has the largest helicopter airport in Connecticut, with 2½ acres leveled off and a seeded down landing patch measuring 125 x 125 ft. The company maintains its own hangar with full-time mechanic. Mr. Futtner



Steady: a 1,100-pound pole being picked up by a Hiller 12 E helicopter on a Montana project. Line Builders, Inc., contractor.



Staff of Angelo Tomasso, Inc., general contractors, of New Britain, Connecticut: William Tomasso, secretary; Joseph Briganti, asphalt plant superintendent; Angelo Tomasso, Jr., president; Victor Tomasso, vice president; George Tomasso, treasurer and (in cockpit) R. B. Futtner, pilot and manager, aviation department of firm.

himself took helicopter training courses.

(2) Another helicopter devotee is D'Addario Services of Bridgeport, Connecticut. This firm does excavation and road work and supplies rental equipment, aggregate, ready-mix and asphalt materials. F. Francis D'Addario is president.

The company's machine is a 4-place Bell model. According to Robert T. McHugh, a company official, the craft affords the opportunity for close and constant supervision of the firm's six plants and its various construction and road paving projects in progress at any one time. "The ability to land at each job site brings each construction project to within a few minutes of our main office," he observed.

The machine is particularly valuable because of the slowness of ground transportation in the firm's congested metropolitan area.

"We have also used the helicopter in disbursing payroll checks. With more than 350 employees scattered over more than 20 locations, the helicopter has reduced this two-day chore to hours," said a company representative, who then noted a completely different use: hauling officials and celebrities on good will tours and aiding in other public relations activities.

(3) Frouge Construction Company, Inc., Bridgeport, Connecticut, also utilize a helicopter for numerous duties. Thomas Frouge, president, stated: "Our helicopter permits John Frouge, our secretary-treasurer, to cover practically every job that is being constructed by us in Connecticut and New York State."

(4) Weeks were slashed off of a tough highway location job by a West Virginia surveying crew as an example of how a helicopter can pay the highway department as well as the contractor. A Bell 47-H owned and operated by Pilgrim Helicopter Services of Washington, D.C., ferried crewmen from point to point, for Tellurometer work on mountain terrain. A survey covering 100 miles took 12 days, one-tenth the time formerly required. Air Survey Corporation handled this job of aerial photography and photogrammetry, with Pilgrim Services giving a hand.

# Interstate road construction on the go in Illinois



KEEP OUR  
ROADS  
ON THE **GO**

Interchange of U.S. Route 41 and Touhy Avenue in Lincolnwood, Cook County

Additional story and pictures on following pages ►

# Illinois builds 1,608 miles of



Left and above: Here are two of 2257 new bridges being built in Illinois. New bridges often carry traffic over previous bottlenecks, make for safer driving conditions, cut traveling time. In some cases creek or river beds are being altered so bridges can be placed in better locations. Many new bridges speed up traffic flow, are replacing old, narrow and unsafe structures. In most cases, USS Structural Steel offers the fastest most reliable and economical method of construction.

Culverts made from USS Galvanized Culvert Sheets are ideal for highway drainage. They completely absorb forces of impact and vibration, so they are excellent for use in high-traffic areas. Strict quality control through every step of production assures long life and dependable performance. Culverts shown here are on Interstate Route 74 in east-central Illinois.



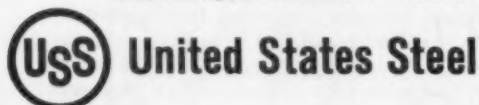
# Interstate roads

## Products of U. S. Steel help keep Illinois roads on the go

Across the rolling prairies of Illinois a wide spiderweb of new highway construction is growing day by day. According to the Interstate Cost Study prepared by the Division of Highways of the State of Illinois in 1957, the estimated cost of 1,608 miles of new interstate roads and approximately 2,260 bridges in Federal and State funds would be \$2,265,573,000. Already, 234 miles of road and 404 bridges have been completed, and under construction today are 140 more miles of road. This new highway network is part of the greatest building project of all time—the nationwide Interstate Highway System. It will relieve congestion and improve the safety record of roads in this rich agricultural-industrial state.

U.S. Steel provides much of the material for the Illinois road-building program. Cement, slag, reinforcing bars and welded wire fabric go into the highways and high-strength and constructional alloy steels, sheet piling, tubular piles go into bridges; drainage products made of USS corrugated galvanized culvert sheets or concrete carry away excess water. Wire rope, cable, tubing and special steels go into the construction equipment that moves the mountains of earth and lays the right of way. For safety, USS furnishes fence, beam and cable guard rail, steel for signs.

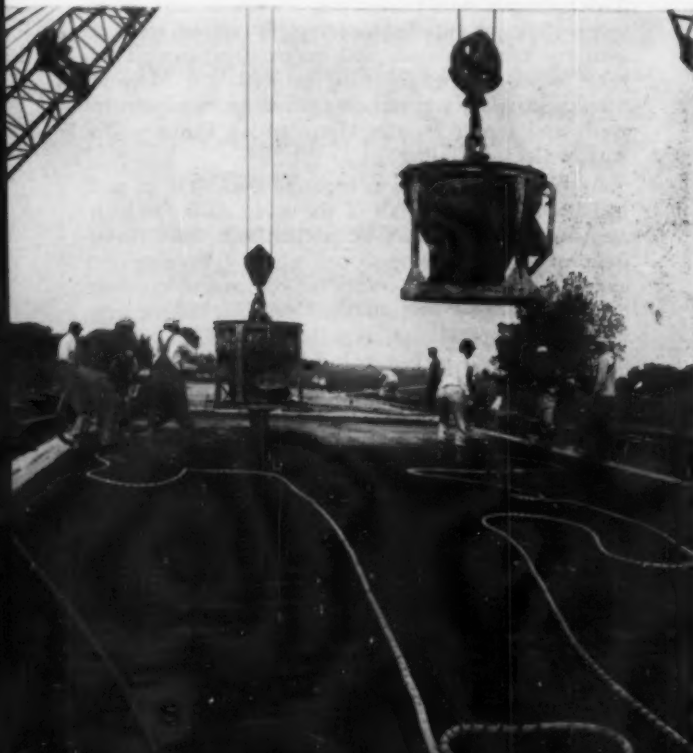
*USS, AmBridge, DI-LOK and VITRENAMEL are registered trademarks*



The highway market is served by the following divisions of United States Steel: American Bridge Division, Pittsburgh, Pa.; American Steel & Wire Division and Cyclone Fence Dept., Cleveland, Ohio; Columbia-Geneva Steel Division, San Francisco, Calif.; Consolidated Western Steel Division, Los Angeles, Calif.; National Tube Division, Pittsburgh, Pa.; Tennessee Coal & Iron Division, Fairfield, Ala.; Universal Atlas Cement Division, New York; United States Steel Supply Division, Steel Service Centers, Chicago, Illinois.



Illinois Interstate Highway network. Solid green lines indicate completed mileage or mileage under construction. Green dots are planned mileage or existing Illinois highways that will later go into the Interstate Program.



These men direct the Illinois highway building program (left to right):

**William G. Stratton**, Governor of Illinois.

**Edwin A. Rosenstone**, Director of Illinois Department of Public Works and Buildings.

**Ralph R. Bartelsmeyer**, Illinois Chief Highway Engineer & Immediate Past-President of the American Association of State Highway Officials.

Workmen pour concrete for bridge surface on Interstate Route 55. U.S. Steel supplies DI-LOK reinforcing bars for concrete construction as well as Steel Sheet Piling, USS Steel H-Piles, and Structural Carbon, Alloy and High-Strength Steels for the bridge itself.



Write for the free 54-page booklet, "Keep Our Roads on the Go." You'll find all the United States Steel products and services that will help you cut costs and speed operations in highway construction. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

# Busy Highway Consultant

**Youthful firm has won road assignments by skillful proposals and offers of quickly needed help to highway agencies**

**By James R. Cummings**

Associate Editor

**A** favorite topic in offices, drafting rooms and trailer field offices continues to be: Where does the consulting engineer best fit in highway work—if at all? What should his relationship be with the state highway department?

To get the view of the "man in question"—and also get a close-up picture of the modern breed of consulting highway engineer—*Roads and Streets* went to a Chicago firm of medium size but one that has grown of late, literally bursting out of its quarters.

Only a dozen years old, Meissner Engineers, Inc., is at work on highway projects in nine states. Meissner's road jobs with 1956 and 1957 construction starts ran to \$16 million; projects for 1958 and 1959 awarded were over \$90 million; and jobs currently on the firm's drafting boards represent around \$303 million.

In the belief of Robert C. Meissner, president, private engineering consultants have two primary roles in highway work:

(1) They can supply added staff and manpower for the work load in state or major county highway departments.

(2) They can furnish specialized knowledge to departments which may need it suddenly on special projects or to solve special problems. Remembering always that the consultants work *for* the highway department.

An illustration mentioned is an Interstate elevated highway project in Reno, Nevada, which involves traffic surveys, hydraulic studies, soils investigation, difficult interchanges. "Bud" Meissner emphasizes that the state highway department of Nevada is familiar with all of these problems, but, to handle the volume of this particular job with schedules in mind, it would have had to hire numerous specialists and then fire them a year later. Rather than take such course, the department thought this a proper occasion for enlisting the services of a consulting engineer.

The Nevada department's chief road design man is a man of skill and experience, Meissner said, but he must also handle administrative duties. If the Reno

project could be spread over many years he could handle the load. The alternate course adopted was to take on a consultant firm with a ready staff covering the skills needed for rapid handling of this big, complex project.

Though highway work bulks large in the company's operations today, Meissner Engineers, Inc., opened its doors in 1949 as an industrial and structural engineering firm. John F. Meissner, Sr., chairman of the board and founder, had been on a manufacturer's engineering staff, and he aimed his own infant organization toward industrial work. But the civil engineering field quickly presented opportunities.

In the early 50's, the company took on the design of a new iron ore development in Sierra Leone in West Africa, largest such project outside the western hemisphere. The job entailed building 100 miles of railroad line, truck access roads and major structures. Then came other civil engineering projects, the Meissner firm eventually tackling a huge one, a flood control study and report for the Metropolitan Sanitary District of Greater Chicago.

By 1955 the firm was in highway work. On its staff had been represented all of the basic skills for highway design and supervision; paving, soils, heavy foundations, drainage, bridges—men who had been project and administrative engineers for companies handling highway projects. The only staff elements lacking were those having specific talents such as for traffic engineering. These were picked as quickly as consistent with selection of well trained men.

The Meissner leaders put forth three reasons for entry into the highway field: (1) the company was "ready" for highway work anyway; (2) the Interstate program offered new opportunities; and (3) opportunity also beckoned on foreign road and bridge engineering work—"especially in Central and South America, a major market," according to Bud Meissner.

Presently the firm works roughly half in industrial,

*Continued on page 117*



OHIO—HUBER-WARCO 5D-190 grader owned by Bruns Coal Company, Zanesville, Ohio, bank sloping on the new Ohio Freeway which connects Cincinnati and Conneaut, Ohio. Their contract called for all the dirt work on a six-mile section. In addition to bank sloping the grader maintained haul roads, cut ditches, leveled fill and finish graded.



## HUBER-WARCO *motor graders*

*with Torque Converter and Power Shift Transmission*

**SMOOTH, FULL POWER NO MATTER WHAT THE LOAD**—Huber-Warco motor graders offer a power train matched to any load condition. It puts more power to work—smoothly, efficiently and economically.

**TORQUE CONVERTER**—Automatic features eliminate engine lugging and heavy load shocks. Engine torque is multiplied three times to give fast, effortless starts even with heavy loads.

**POWER SHIFT TRANSMISSION**—Power shifting makes the grader far easier to operate because of fewer controls. Shifting up or down under load at full throttle is done by moving one lever. Tailshaft governor maintains speed set on hand throttle.

**HYDRAULIC CONTROLS**—Complete blade control without leaving the cab—including all bank sloping positions. Easiest graders to operate means less operator fatigue and more production.

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Standard transmission models from 83 to 160 H.P.  
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Attachments are Lift-Loader, Broom, Bulldozer, Patch Roller, Scarifier, Snow Plow, Berm Leveler

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# PACAL

## x-tra-edge blades

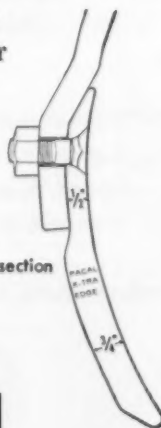
See the extra steel in the Pacal X-TRA-EDGE hardened center section.

This new design provides extra working steel right under the greatest weight of the machine. It resists crowning and blade metal waste is kept to a minimum. Users tell us of as much as six times longer wear, up to 40% lower blade costs . . . used in winter and summer; on maintaining gravel roads or pavement, on shoulder maintaining, on snow and ice removal, on oiling and road mixing or blacktopping. It pays to use PACAL X-TRA-EDGE BLADES.

Accurately punched for all makes.

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Also available  
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County Highway Official, Missouri—"Pacal  $\frac{1}{2}$ " to  $\frac{3}{4}$ " x 8" special hardened blades giving about 5 times more wear than  $\frac{1}{2}$ " x 6" blades."

County Highway Official, Minnesota—"380 hours on machine before blades were worn out."

County Highway Official, Iowa—"After one year's use new Pacal blades have saved our county 40 to 50% in blades and bolt costs."

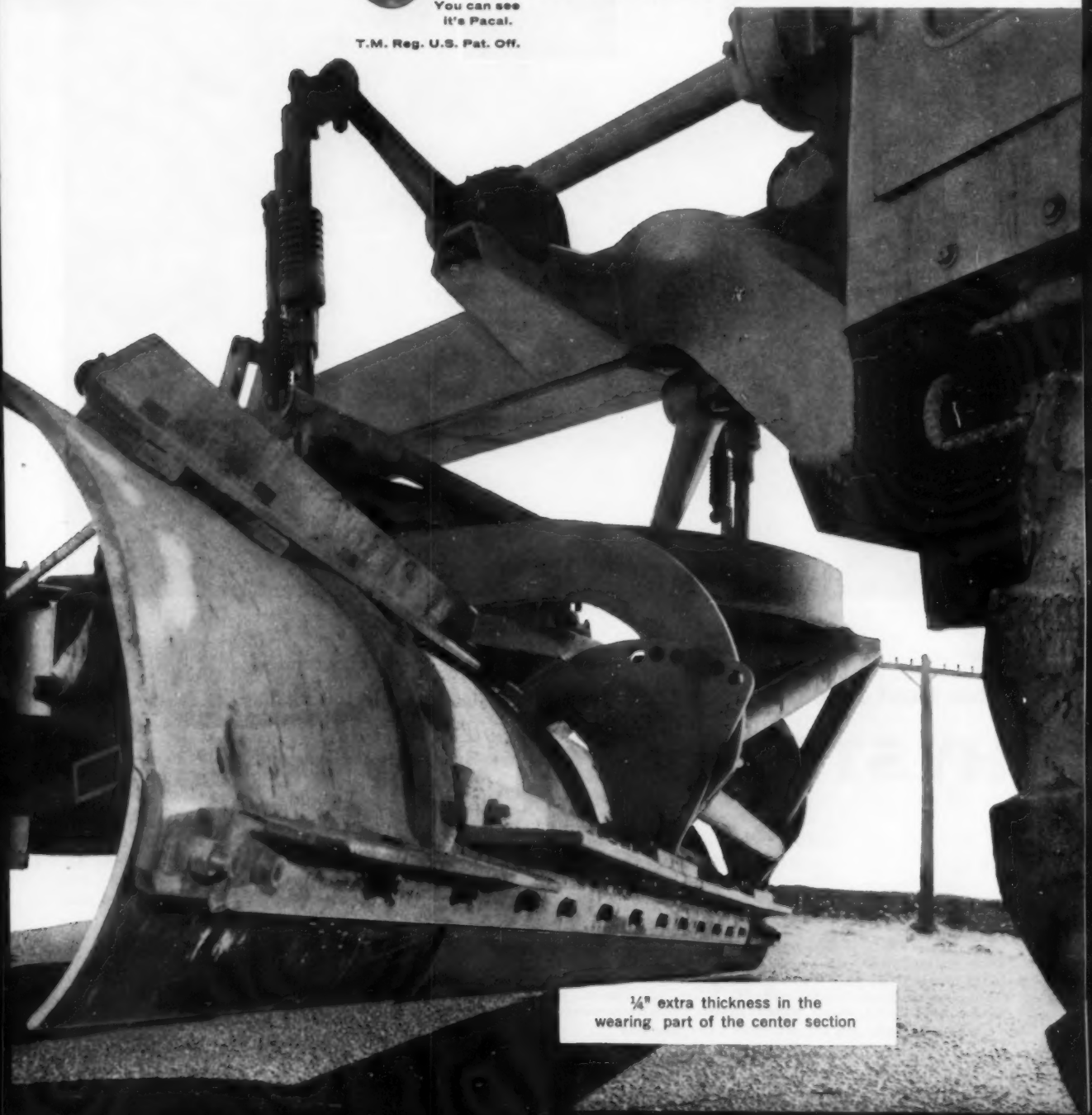
County Highway Engineer, Iowa—"Special hardened blades very satisfactory here. Switching to this three-piece arrangement 100%."



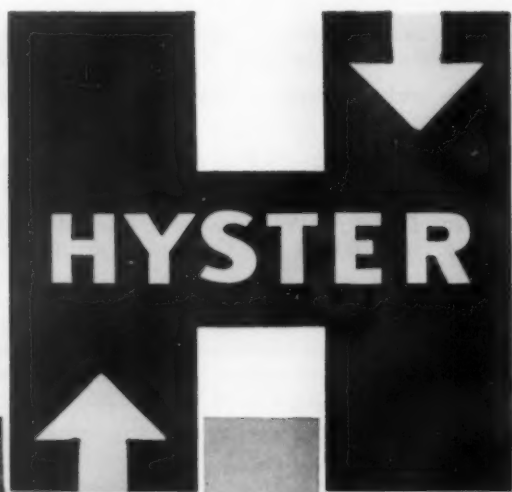
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it's Pacal.

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$\frac{1}{4}$ " extra thickness in the  
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**HYSTER COMPANY**  
 TRACTOR EQUIPMENT DIVISION  
 P. O. Box 328 • Peoria, Illinois



One of the Meissner drafting rooms at Chicago headquarters.

## BUSY HIGHWAY CONSULTANT

*Continued from page 112*

half in civil engineering, depending on the work load. Its soils, survey and foundation work, its computer design and certain electrical and heavy structural design activity—all are common to a degree to these two fields. And it is this double exposure to engineering that has brought about the Meissner company's flexibility as a highway engineering consultant.

This flexibility often means the difference between "a profitable and a not-very-profitable job." During the early stages of an Interstate design assignment, for example, Meissner may have 20 or 25 men at work; after submission of designs, the list is reduced to possibly five. A firm engaged just in highway work can transfer these men only from one road job to another. Meissner can do this, but can also move them to heavy concrete and structural industrial job.

The Meissner company is always asked what its percent fee will be. The Meissner answer:

"We won't know until the job is walked over, flown over and then broken down into the dozens of basic steps including manpower needed, hours needed, and cost of the work to us. These dollars then are converted into a percentage cost, and this is what our percentage will be."

With its computer, tellurometer, photogrammetry and soils lab facilities, the firm has not yet had to turn down a job because of lack of specialized equipment and facilities, and likewise, according to Meissner, they have not met a situation where the proposed fee based on service cost has been unacceptably high.

How does Meissner—or any consulting engineer—obtain its highway work? The answer lies in the job

proposal procedure followed by state highway department and ethical private engineering firms.

A state will ask a number of consultants—averaging usually from three to five—to look at a job. It requests each to submit a proposal on how it would handle the project, outlining the personnel, equipment and techniques to be used, schedule to be followed, and so on. These proposals can be oral or written.

The consultant then conducts a thorough investigation of the proposed work. At Meissner, when the "raw material" of this study has been obtained, a top administrative group meets to sift the details and formulate a proposal. This group consists of the chief civil engineer, highway engineer and bridge engineer, plus a project engineer considered best qualified to handle the proposed job.

Out of these proposals, the highway department chooses a firm and asks it to submit a price. The department, which has made its own job analysis regarding a permissible price range for engineering, may reject this firm on the basis of price alone and go to another consultant. If the fee is accepted, there will be further discussion on the company's proposal, its grasp of the problems and its experience with similar types of work.

The Meissner organization undertakes to make its original proposals add up to as complete a study of the job as circumstances and available information will permit. It is so complete, in fact, that, in it, the actual cost estimate is made. This latter, though, is kept confidential until requested by the state. Submission of prices with the original proposal would enter the area of bidding, and according to Robert Meissner, "To begin a system of competitive bid fees



Aerial photo of the Virgin River gorge in Arizona. Meissner engineers are studying difficult location of Interstate 15. (Proposed route shown by broken line.)



The company's computer department includes a Bendix model G15D unit, a manager, assistant manager and operator.

would bring chaos because the tendency would be to cut corners and lower the quality of the work."

A rundown of some current and just-completed Meissner jobs offers a glimpse of the company's diversified activity in highway engineering.

(1) The company branch office in Reno, staffed by 15 engineers, is working on design for an 8-mile Interstate section between Reno and Sparks. The principal feature is a 4,800-ft., \$10 million continuous elevated bridge, probably the first of its type and size in this country. Difficult foundation conditions are involved. Prestressed box girder design is planned.

This Meissner contract also involves geometric design for complicated interchanges including split diamond

and semi-directional facilities to provide service in many directions. Because of the urban environment, a river to be crossed and other restrictions, the firm made a special traffic and alignment study and report. This report was the basis for the consultant's recommendations on location and type of interchanges, street relocation, number of lanes required on the freeway and other project features.

(2) Meissner recently has worked on a route location survey for the Arizona highway department for Interstate 15 through the Virgin River gorge in the northwest area. This 22-mile segment will require new right-of-way through the mountains, with probably eight major bridges crossing deep gorges, and from



## Some of Meissner's Highway Job Assignments

Client	Estimated Construction Cost	Mileage	Type of Work	Starting Date
State of Illinois	15,300,000	12.5	Design	Dec. 20, 1956
State of Illinois	378,000	—	Br. Design	Sept. 20, 1957
State of Illinois	333,000	—	Br. Design	Mar. 7, 1958
West Virginia	10,620,000	6	Design	Mar. 12, 1958
West Virginia	7,630,000	6	Design	Jun. 12, 1959
South Dakota	5,300,000	15	Design	July 1, 1958
South Dakota	6,030,000	17	Design	Jan. 12, 1959
Wisconsin	5,660,000	10.5	Design	Oct. 1, 1958
Alaska	3,280,000	60	Rt. Loc.	Aug. 26, 1959
Alaska	3,280,000	60	Design	Aug. 26, 1959
Arizona	25,500,000	22	Rt. Loc.	Jun. 11, 1959
Alabama	5,500,000	3	Rt. Loc.	July 15, 1959
Nevada	16,500,000	8	Design	Nov. 6, 1959
West Virginia	180,000,000	150	Rt. Loc.	
Alabama	5,000,000	13	Design	
Alabama	8,000,000	17	Rt. Loc.	
Alabama	8,600,000	6	Rt. Loc.	
Montana	20,000,000	26	Rt. Loc.	

three to five tunnels comprising roughly 1,000 ft. of twin tubes through rock.

The consultant will recommend alignment, gradient, number, type and location of structures, number and location of tunnels and tunnel construction procedures to be used. The firm's people will use a Tellurometer-helicopter combination to locate the centerline.

(3) In West Virginia, the firm is doing final design and construction plans for 12 miles of Interstate 77, which will connect Parkersburg and Charleston. Meissner also has mapped 150 miles of primary roads in the state.

(4) Another job is in the final plans stage for 35 miles of Interstate 29 in South Dakota.

(5) The company also has an Alaska job, a pioneering task replete with textbook obstacles. It involves designing a 60-mile, 2-lane highway from Eureka west to Tanana (pop. 200) on the Yukon river. This section is in the center of the Alaskan peninsula and will be part of the projected 520-mile Fairbanks-Nome highway.

The engineering is being done in three phases: a reconnaissance study to recommend location within a 10-mile corridor, preliminary plans and final construction plans.

Soils and geology are important factors; premafrost is a problem and geological and climatological data are scarce. Bridging the mile-wide Yukon riverbed at Tanana will be a major problem, complicated by huge flood flow, ice floes and deep foundation requirements.

Meissner is casting eyes on more overseas work; negotiations are in progress with Haiti, Saudi Arabia, Nationalist China, Venezuela, Colombia, among other countries. Apart from the revenue involved, Meissner likes foreign assignments because some of the problems often "are new ones to conquer," while other complexities of design are minimized—or non-existent. In Brazil, for example, where 30,000 miles of new highways are being planned, there are special obstacles in routes, soils and photogrammetry, but the highways will be geometrically simple because of relatively light traffic.

Language is just one more problem in this overseas

work. Meissner meets this barrier with determination: a Berlitz teacher comes to the firm's Chicago office three times a week to teach Spanish to a dozen top people in the administration, engineering, accounting and legal departments.

Meissner headquarters fringing on Chicago's loop has been expanded to accommodate the staff of 260 engineers, computer department, teletype, blueprinting machine and new materials laboratory.

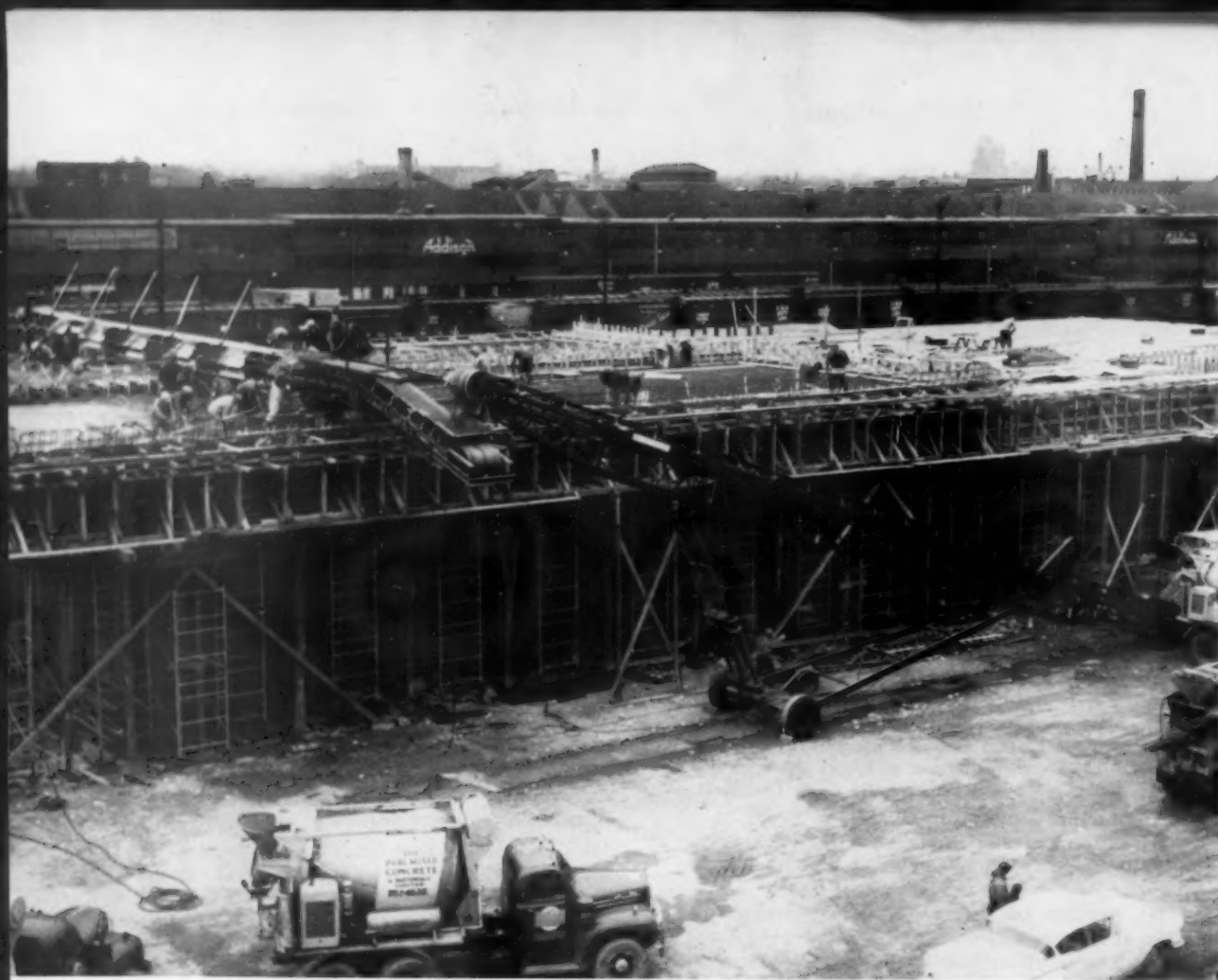
What is the key to a firm's success as a consulting engineer in the road program? Without hesitation, Bud Meissner replies: "You must have the attitude that you are providing the state highway department with an auxiliary service, something it does not have in staff numbers or special skills or both."

"In getting into civil engineering," he said, "we have wondered whether we would find highway department men of a calibre which would make it professionally satisfying to work with them. This has been the case, exceptionally so."

For the future, Meissner executives believe that the highway program will provide increasing work for consulting engineers (others' opinions to the contrary). The company's present program is for continuous growth and emphasis on acquiring highly qualified people. It has inaugurated its own research program in automatic drafting devices to cut down on drafting time and "let engineers be engineers"—as one example of internal refinements in company procedures.

At this time, Robert Meissner feels, the potential of the consulting engineer in highway construction lies primarily with the smaller states and their smaller highway departments. But, he adds, future demands that may come with new financing legislation may broaden the opportunities.

Meanwhile, every highway department for whom the Meissner organization has done jobs in the past has given the company further work to do. "We are happy about this, naturally," observes Meissner, "but we regard it also as testimony to the role a consulting engineer can play in highway work."



The conveyor scheme made use chiefly of standard Barber-Greene components.

## Concrete Overpass Poured Faster, Cheaper With Conveyors

When Orsini Construction Co., Ltd., was awarded the overpasses on the Gardiner Expressway in Toronto, Canada, the firm's leaders looked around for a faster, more efficient way of pouring concrete. They felt the old methods requiring elevators or cranes and concrete buggies were too costly in both manpower and machinery. A new, highly mechanized method was sought which would handle a volume of concrete with as little labor as possible.

Orsini brought their problems to Barber-Greene Canada, Ltd., because of the company's long experience in materials handling. This manufacturer's sales, engineering, and service personnel developed preliminary plans based upon the use of belt conveyors. For reasons of

low initial cost to the customer, simple maintenance, and easy portability, standard components were used wherever possible.

An experimental model was constructed and tested under conditions similar to those anticipated on the project. Results indicated that the use of a flat carrier was feasible, providing the belt was at least 30 in. wide to prevent concrete spillage.

Standard components proved able to fit the problem. For example, a conveyor was needed to raise concrete from near ground level to a height as great as 40 ft. This phase of the problem was solved by modifying a standard portable conveyor. Standard head and tail end terminals, normally used on stockpile conveyors, were coupled with equally standardized truss sections to make up a portable conveyor of conventional design, but of greater than normal length.

To allow for vibrations in required discharge height, a special mast had to be designed to allow the discharge terminal to be moved up and down through a 9-ft. arc. The answer: a tubular telescopic mast powered by a double-acting hydraulic ram.

In spite of all these additions, the now-giant portable conveyor was still portable, meeting all highway length and width restrictions. For travel, the mast was folded back under the conveyor boom. Head and tail ends were detached and carried on top of the conveyor.

Easy portability was also required of the horizontal conveyor which was to distribute concrete into the forms. Again standard components were used. These included a 24-in. truss, 30 in. flat belt idlers, and standard head and tail end terminals. The whole assembly was mounted on three sets of flanged wheels so it could be moved along on temporary rails while pouring.

The conveyor system thus assembled gave everything Orsini Construction Co., Ltd., hoped for in labor economy, high production and easy portability. Orsini officials estimate that, using conventional methods and a larger crew, they would have been able to pour only about 30 cu. yd. of concrete per hour. With their system the crews placed pour 60 to 80 cu. yd. per hour and the flow of concrete was constant.

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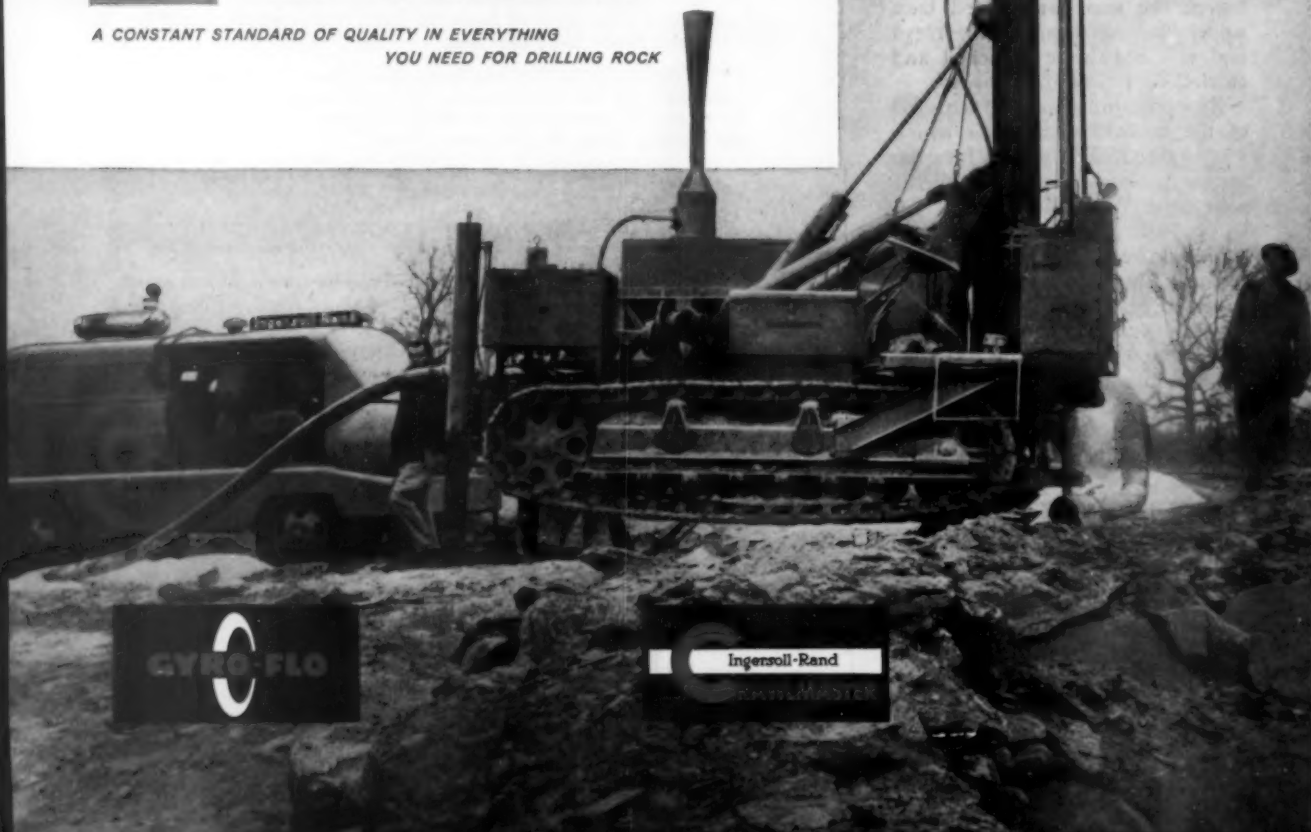
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on this Cedarapids Bituminous Paver while she describes the all-automatic controls to Miss State University of Iowa. The popular TV and movie star knows more about acting than she does about machinery, but she certainly knows about popularity. When a machine becomes as popular as this Cedarapids Paver, you can be sure its performance is "way above average."



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Operating speeds up to 102 feet per minute get the job done quicker and at less cost. You can handle more jobs per season.

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*"Fastest Paver alive! Its precision performance is far beyond our expectations."*

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*"It's the best machine I've ever used."*



*"We like the speed and mat-laying qualities of the Paver, and also the design of our Cedarapids Bituminous Mixing Plant."*

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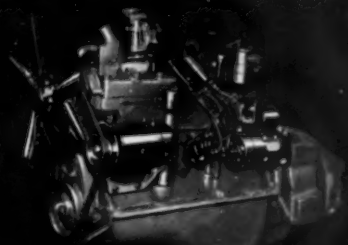
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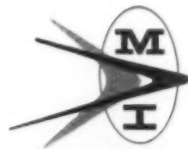
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Showing the "inner tubing", one of the secrets of the pipe making process.



Ready-mix concrete is fed into a hopper specially designed for the pipe-making procedure.

## Pipe Poured in Place

Construction machinery that builds "instant concrete pipe" in a freshly-cut ditch at a rate of 8 to 12 ft. per minute has been developed by Fullerform Continuous Pipe Corp. in Arizona.

Currently being used to build conduits for irrigation water on farms near Phoenix, the process is being adapted to build storm sewers and concrete pipes of types entering into highway and street work. The method is said to eliminate joints and seams and cut construction time and over-all costs.

Inflatable rubber and fabric forms, designed by Goodyear Aircraft Corp. engineers from blimp-type materials, are part of the continuous-operation system.

Using two 300-ft. inflated forms with only 3 psi of air pressure, Fuller can pour as much as 600 ft. of concrete pipe without interruption. Forms can be lined up for runs in miles, as long as the ready-mix trucks keep coming.

Developed over the past nine years, the construction process con-

sists mainly of a double-hoppered forming machine that is pulled along the rounded bottom of a ditch, while enveloping an inflated inner form.

The inflatable "inner" form is picked up by the "outer" form so tamping devices can literally tuck concrete under it. Half of the double hopper, activated by electrically driven tampers, shoves concrete into the bottom of the ditch, while the other half is forming the top of the pipe.

# Florida Causeway, Example of Latest in Highway Lighting

Modern lighting is one of the noteworthy design features of the new Miami to Miami Beach 36th Street Causeway, recently opened to traffic in the Florida metropolis. Following are some of the details supplied to *Roads and Streets* by state highway engineer A. C. Church and staff.

The lighting was installed as specific items under three general roadway and bridge complete-package contracts for the causeway, which is an Interstate highway project.

The end-to-end length of the lighted project is 2.98 miles, of which 3,958 linear ft. is bridge structure. This 2.98 miles, end-to-end, does not include the approximately two miles of additional lanes, ramps, etc., which constitute the Interchange on the Miami Beach side. These lanes are also lighted as part of the project.

The design intensity is for approximately 0.9 lumen per square foot, maintained. The luminaires are end-mounted (2-in. adjustable fitter) aluminum, with 400-watt, color improved lamps. The ballasts are of the regulated output type, with operation of 400 to 520 volts.

For actuation of the system, the Florida Power and Light Company furnishes primary switching, coordinated with adjacent street-lighting installations.

The light poles are transformer base type. The shafts are round-spun aluminum, tapered from 8 in. to 4 in. and with 0.188 in. wall thickness.

On roadway sections the posts are mounted on pre-cast concrete bases, of a tapered design. Bracket arms are 12 ft. long tapered aluminum, with elliptical cross section.

On bridges the pole bases were poured monolithically with the superstructure in the handrail line. Roadway poles are set 11 ft. from edge of pavement (3 ft. from edge of paved shoulder). Bracket arms are 6 ft. long tapered aluminum.

Bridge poles are spaced at about 125 ft. staggered. Roadway poles are staggered at approximately 130 ft. spacing on either side.

The power centers for the system were installed by the contractors—one at the west end of the westerly main bridge and the other near the load center of the Miami Beach Interchange. In lieu of the

conventional fence-type enclosures, the power centers, for aesthetic reasons, are enclosed by open top, concrete block walls. The switching on the high-voltage side of the power centers, transformers and high-voltage equipment were furnished by the Florida Power and Light Company. The power is brought in at 13 KV, and the lighting circuits are 480-volt multiple.

Conductors for power service consist of one 15 KV, No. 4 paper-insulated, lead covered, with a protective neoprene jacket and one 600-volt, No. 4 neoprene-jacketed, Style RR neutral. Conductors for the lighting circuits are direct-burial, 600-volt, Style RR, neoprene-jacketed.

On the bridges these conductors are of copper, as was originally designed, but on the roadway sections the contractor was permitted to use aluminum of appropriately larger size.

Pole bracket cable is No. 10, 600-volt, 2-conductor cable, Type USE, Style RR.

The 15 KV lines for power service are installed in 3-in. asbestos fiber ducts encased in concrete to a minimum of 3 in. cover. Manholes are spaced at approximately 500 ft. The lighting circuits on the bridges and for cross-unders under paved areas are installed in high-impact, schedule 40, polyvinyl chloride conduit.

Grounding of light poles and associated metal parts on roadway sections is by Copperweld, 5/8-in. by 8 ft., driven 6 in. below ground. On the bridges the grounding is accomplished by a No. 4 bare conductor, connected to driven grounds and the system ground at the ends of the bridges.

The apparent total cost for the lighting system for the entire crossing is approximately \$242,000.

Prime contractors for the overall projects were Powell Brothers and Heavy Constructors, Inc., and Troup Brothers, all of Fort Lauderdale. Electrical sub-contractors on lighting were West Florida Electric Service Company, Panama City (on the larger bridge), and Astor Electric Service Company, Miami Beach (remainder of the crossing).

Resident engineer for the state road department in overall charge was H. M. Post. Design and technical supervision of the lighting installation was by Claude H. Jernigan, department electrical engineer.

New causeway which ties one more "shoe lace" into the Miami metropolitan arterial network.



The new Miami to Miami Beach causeway and its approaches and ramp connections afford an excellent example of the safety and efficiency promoting benefits of modern roadway lighting.



# Production up 16%

Michigan Dozer: *replaces 2 crawlers on fill*

Michigan Pusher: *eliminates crawler track costs*

Michigan Scraper: *more loads per shift*



On L. A. Reynolds job in Florida, 375 hp, 74,000 lb Michigan Model 380 Dozer push-loads Model 210 Michigan Scraper to 15 pay yd spill-point in under a minute.

Model 380 push-loads just as effectively in reverse as forward. Tractor thus saves backup and positioning time.





# profit up too

On Interstate work near Orlando, Florida, an enterprising contractor has boosted normal production  $\frac{1}{2}$  or more—cut his man-hour requirements—and upped profits.

The firm is L. A. Reynolds Company, Winston-Salem, North Carolina. Their job: an 850,000 yd double figure-eight interchange. Their "secrets": a unique way for quickly drying wet material—plus three new high-speed machines—all Michigans—a 262 hp Model 280 Tractor Dozer, a 375 hp Model 380 Tractor Dozer and a 19-yd Model 210 Tractor Scraper.

## Deep ditches, strip loading help overcome moisture problems

Let's talk about their "drying" method first.

The problem here involved overcoming the effects of 97 inches of rain (in 11 months) and a water table only six inches below ground level. Frank and Herbert Reynolds, two of the four brothers who own the company, plus their job supt, Ernest Wilcox, devised this solution. With draglines, they dug perimeter ditches 10 to 14 ft deep around their entire 47 acre borrow pit. Water was allowed to drain from most areas for days. Dirtmoving, started at the ditch lines, was worked toward higher ground in 100 ft strips; this gave the water table even more chance to lower itself.

Keeping up with four haul units, the one 262 hp, 56,000 lb Michigan Model 280 spreads fill over 1400 x 108 ft area. Job used to require two crawlers.



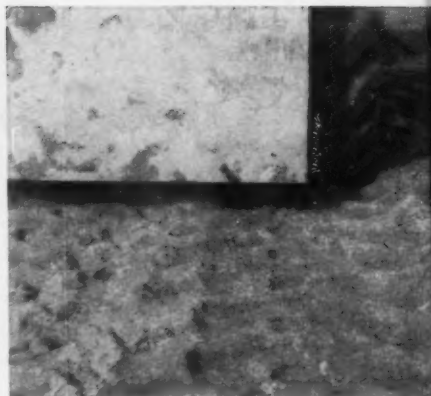
## Pusher loads alternately forward and reverse

Loading too played a key role in the profit picture. To take advantage of their Model 380 Michigan Dozer's four speed ranges in both forward and reverse, unit was equipped with push-blocks both front and rear. Thus, throughout the job, the Model 380 loaded scrapers in alternating directions, saving all turns and all backup time. Rig serviced four scrapers with time to spare . . . regularly loaded and boosted each scraper out of the cut in under 1 minute. Load size ranged from 14 to 16 pay yards, *scale-measured*, depending on which of the eight kinds of material was encountered—ranging from quicksand to sandy clay.

"With scrapers on fair haul roads," says Supt Wilson, "the torque converter-power shift transmission Model 380 accounted for 40 or 41 loads per hour. In better material, the high-speed Model 380 turned out as many as 68 loads per hour."

## Dozer spreads 7,200 yds, also does odd jobs

Similar speed advantages were reported on the fill. Here, Reynold's 56,000 lb Michigan Model 280 Dozer replaced two 50,000 lb class crawlers. It had no trouble keeping up with the four scrapers—spreading up to 7,200 pay yards per day along a  $\frac{1}{4}$  mile long, 108 ft wide right-of-way.



Low-pressure wide-base tires provide adequate pushing traction even in this soft sand.

In addition, the Model 280, with its go-anywhere 28 mph mobility, had time to travel *off the fill*—keep haul roads in shape, muck out topsoil and gumbo, perform emergency tasks.

## More dirt, fewer dozers add up to more profit

But most important, perhaps, was the continuous profit story. Operator load-counts showed an average of five extra loads per 10-hour day for the power-shifted, torque converter-equipped Michigan Tractor Scraper. Cross-section computations, Michigan Model 380 vs the 320 hp crawler-pusher formerly used, showed an extra pay yard or two per load for all scrapers. *In addition, with rubber-tired machines replacing crawlers, there was a substantial saving in track repair costs.* Still more money was saved in operating costs, two dozers vs three.

With a Michigan Tractor Dozer or two, we honestly think you can get similar results. Why not at least see? There are four Michigan Tractor Dozer models—162, 262, 375, and 600 hp—call your Michigan Distributor for a demonstration. The test will cost you nothing . . . and it *may* put thousands of dollars in your pocket.

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Steeply inclined foliation of mica schist seen here, as the Lima 4-yd. shovel dispatches LeTourneau-Westinghouse B Tournarockers.

## GETTING GOOD FILLS

*Continued from page 67*  
through a winter for possible settlement, before paving. The OK was given however, and the grading work was accelerated and paving placed by the deadline. As of May 1, 1960, after eight months of two-way traffic on the southbound roadway, no settlement has been found in any of the fills; and only one mishap, a local shoulder area where surface water brought a small slip-out.

These field observations are remindful that each large highway project involving rock and earth materials is a new adventure for both the engineers and the contractors. On the Connecticut Route 8 job, the inspection force consisted of two men on the drainage work (which involved special problems); two on excavation, filling and gravel subbase screening; and seven others on the paving and plant inspection.

State-wide interest was shown in the unusual degree of coordination and cooperation achieved here between the engineers and the contractors. In commenting on the job, one state highway official said, "The contractors here have completed more work in less time than for any

other Connecticut state road job to date."

The Route 8 project was under the field direction of Wm. W. Waterhouse, supported by District IV personnel of the Connecticut state highway department, M. A. Lyack, Assistant Chief of Construction, maintains offices at 25 Wolcott Hill Road, Withersfield. Loid F. McCarthy was superintendent and George Woolweaver chief engineer for Savin Brothers, Inc.

This job has entailed many other interesting problems. Suffice it to note here that the work is an example of good control of embankment construction using constantly varying rock and mixed materials from the cuts—a problem that is basic to all roadbuilding today in hilly or mountainous terrain.

## Background Look at Connecticut's Procedures

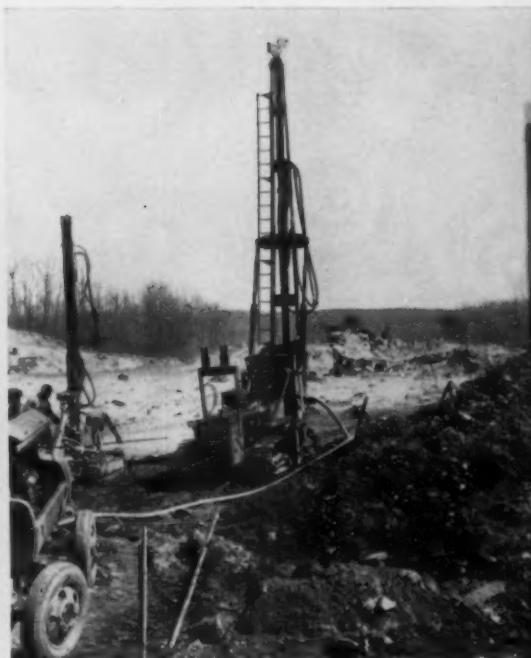
While the day-to-day problems in grading this job to satisfactory standards are of interest, more widely so will be a general review of the Connecticut state highway department's practice and their specifications governing such projects.

As summarized by a staff engineer, the Connecticut state highway department's current Standard Specifications, Form 808, are quite explicit in their requirements with respect to the use of rock in embankments; following is the applicable wording:

"When the excavated material consists predominantly of rock fragments, of such size that material cannot be placed in thin horizontal layers without crushing or further breaking down the pieces resulting from the excavation methods, such material may be placed in the embankments in horizontal layers not exceeding 3 ft. in thickness. Each layer shall be leveled and compacted with a suitable bulldozer. Large stones shall not be placed in nests, but distributed over the area and the interstices filled with spalls, finer fragments or earth to form a solid, compact mass."

Close adherence to the above requirements in Connecticut, according to one department spokesman, has produced embankments satisfactory as to density, stability, and freedom from residual settlement in the embankment itself.

It is self-evident, this state engineer continued, that the standard



Bucyrus-Erie 4-yd. shovel at another location, loading Euclids in an area of soft rocky material—again illustrating the day-to-day variability of the "fill makings." (At right): Joy 4-in. drill smaller track-drill in a medium-cut area.

methods of determining compaction achieved cannot be applied when the material consists predominately of rock fragments. Success depends largely upon intelligent supervision in the field to accomplish the desired result, namely, "to form a solid, compact mass." This requires cooperation between the contractor's organization and the field representatives of the engineer.

The methods of handling the material must remain flexible enough to suit changing conditions. However, Connecticut experience indicates that best results usually are obtained by dumping on top of the lift being constructed, and then dozing the larger pieces over the edge, from whence they find their way to the bottom of the lift. The next dozer pass is made with the blade lowered enough to move the intermediate size pieces, which then will fall between the larger pieces already in place. The operator regulates succeeding passes as indicated, either to fill remaining smaller voids or to complete the general sealing and surfacing of the lift.

Another place in Connecticut's specifications usually would apply to "Rock and Miscellaneous Ma-

terial." Under these conditions it normally is considered possible (sometimes after a few trials and by exercising good judgment) to perform the required compaction tests. This specification reads:

"Embankments shall be constructed of earth, rock or a mixture of earth and rock, deposited in successive layers for the full width of the embankment. Except as hereinafter permitted the depth of each layer shall not be more than 12 in. before compaction. Each layer shall be leveled off by blade graders or bull dozers, with adequate power for the work involved. The entire area of each layer shall be compacted by distributing the hauling over the area, by the use of tread type equipment, by power rollers weighing not less than 10 tons, or by other mechanical means satisfactory to the Engineer.

"Compaction shall be continued until each layer is thoroughly consolidated for its full width," this wording continues. The dry density of each layer after compaction shall not be less than 90 percent of the dry density achieved by the AASHTO Method T-99 for that soil. Depending on the material and weather

conditions, it may be necessary to supplement mechanical compaction methods by control of moisture in the material."

Needless to say, the Connecticut engineers observe, it is imperative that the tests truly represent the general condition of the material in the embankment lift being placed.

*Proposed Future Specifications.* In Connecticut the state department presently in the process of revising our Standard Specifications and the particular section on embankment has not as yet been completely formulated. It is possible, however, to outline certain general features.

Connecticut specifications recognize, in general, only two classes of excavated material for embankment, earth and rock. A 2 ft. depth of fill is required over the rock embankment in general, although job special provisions may reduce this to 1 ft. The problem of hauling over rock fill is the responsibility of the contractor alone.

State embankment specifications for dry density are based on 95 percent of AASHTO T-180 Method D for soil; the consolidation of rock





A roughed-out embankment, as seen early in the 1959 season on Savin Brothers' Route 8 Connecticut project. Note lower grade for the other roadway at right. Lorain backhoe is trenching for a culvert.

lifts is left to the engineer in the field, with the maximum size for rock limited to 3 ft., the same as the lift.

Except for the removal of muck, other unsuitable material, or topsoil as may be directed, the natural ground is not disturbed. Fill in water area must be of rock or free draining material up to an elevation of 3 ft. above the water table.

**Underlying Materials.** Connecticut practice with respect to underlying natural ground in fill areas is to carefully evaluate the foundation areas for all embankments, be they rockfill or otherwise. If the ground

should be of a type predisposed to excessive settlement or displacement, adequate field investigations by geological reconnaissance, borings, probings, etc., are made along with selective sampling. Recovered samples are subjected to further laboratory testing and evaluation.

Following this, a careful foundation engineering study is made in which factors such as foundation strength characteristics, stability, possible construction costs and methods, contract scheduling, embankment loading, are considered.

From these studies, the most sound and economical foundation

solution is prescribed during the project design stage, so that it will be incorporated in construction. As a result, the post-construction performance of these embankments can be reasonably predicted.

### AGC's 'Plan Bulldozer' Wins Merit Award

The Associated General Contractors of America's disaster relief program, "Plan Bulldozer," has won for the association the Award of Merit from The Chamber of Commerce of the United States.

The award was presented to AGC president John A. Volpe, Malden, Mass., this week by Erwin Canham, president of the Chamber. The award cited the AGC "for significant contributions in the business and public interest."

"Plan Bulldozer" was developed by the national AGC Disaster Relief Committee for implementation by the association's autonomous chapters and branches.

The plan, which can be adapted by AGC chapter groups to meet local conditions, furnishes simple guides for mobilization of equipment and trained personnel of the construction industry, when needed to ward off disasters, alleviate suffering and hold down property damage in the wake of disasters. Thus far, more than 30 chapters have adapted the plan to their needs.

### Early-Stage Equipment on Million Yard Route 8 Rock Job

#### Drills

- 2 Ingersoll-Rand Quarry master drill (6½ in.), mounted on a Caterpillar D9 and an Allis-Chalmers HD19 tractor, respectively.
- 2 Gardner-Denver Air-Trac drills (3 to 3½ in.).
- 2 Ingersoll-Rand Crawl-IR drills (3 to 3½ in.).
- 2 Joy Challenger drills (4 in.).

#### Compressors

- 2 Ingersoll-Rand 600 Gyro-Floes, one each of the Quarrymaster units.
  - 1 Ingersoll-Rand 600, trailer-mounted.
  - 1 Gardner-Denver 900 cfm, trailer-mounted.
  - 1 Joy 630 cfm, trailer-mounted.
- Savin Brothers, Inc., grading equip-

ment, as seen in Spring of 1959, on the Route 8 first contract.

#### Shovels

- 1 Lima 1601 (4 yd.).
- 1 Lima 1002 (2½ yd.).
- 1 Bucyrus-Erie 71-B (4 yd.).

#### Wagons

- 12 Euclid rear-dumps (25 yd.), new, with torque converters and GD diesel engines.
- 2 LeTourneau-Westinghouse Model B Tourmarockers (25 yd.).

#### Tractors

- 4 Caterpillar D9.
- 1 Caterpillar D6.
- 1 International TD24.





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**In Indian Village, they paved 110 blocks**  
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The Indian Village subdivision of Salina, Kansas, is a 5-year-old neighborhood of modest homes . . . and progressive homeowners!

Worn-out, potholed, all-but-impassable streets threatened to turn the area into a suburban slum. Neighbors got together to do something about it. They found they could have modern concrete streets, pay for them over a period of 20 years under the provisions of a new Kansas law.

Then they proved the durability of concrete to the city council, showed the monthly assessment against homeowners to be much less for concrete than for asphalt on a 20-year basis.

They got their concrete streets—110 blocks of them in the biggest street paving program ever in Kansas. And everywhere houses showed dramatic

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And when the streets are paid for, they'll still be "new"—flat and smooth-riding as ever. Concrete is the one pavement that you can expect to outlast the 20-year assessment.

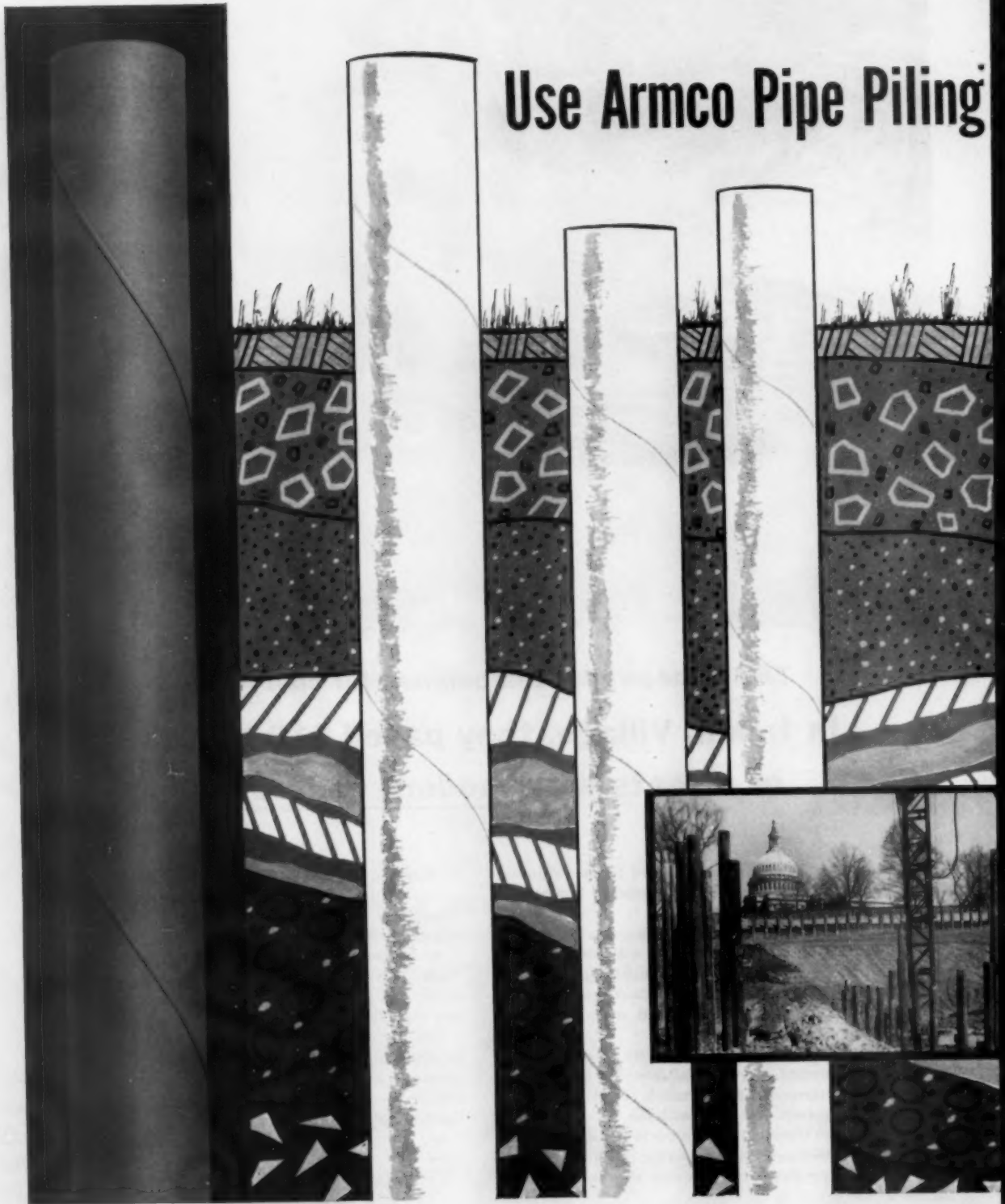
Thrifty concrete offers true economy for taxpayers, both today and in the future. If you are planning a street paving program, write for free literature—technical and nontechnical. (U.S. and Canada only.)

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The mechanics' benches along the wall of the main "heavy" shop, where seven or more large machines can be torn down simultaneously.

(Left): Library of manufacturers' parts catalogs in the shop office. (Center): Heavy track press in the welding shop, used chiefly for tractor rollers. (Right): A bucket which has been hardfaced, given new teeth and fittings, repainted, and is awaiting shipment with its parent shovel.





## CONTRACTOR OVERHAULS

*Continued from page 62*

project were in the shop. The main shop room's seven bays were occupied in this order: (1) parts and assemblies, (2) a Payhauler, (3) a P&H truck crane, (4) another Payhauler, (5) a third Payhauler, and (6) a Lorain truck crane, heavy truck. The Payhaulers, which bulked large, were thus spaced between smaller units for working convenience.

The overhead cranes for the room are divided into two bays, with a 3 ton crane over the heavy machines, and separate cranes over the rear area serving smaller units.

Along an end wall is a feature not seen every day: piping and duplicate dispensing cocks for various grades of lubricants needed for refilling crankcases and transmissions.

The main shop also has its own compressor and enough welder and acetylene carts are on hand to perform work necessary. This equipment figures importantly, since repair of damaged bodies and frames is a major part of the work. Hydraulic equipment is also overhauled or at least checked as part of the main-shop routine.

3. At the other end of the long main building, on the opposite direction from the centrally located office and parts depot, a 60' x 80'

room is given over entirely to diesel engine and transmission overhauls. Sufficient floor space is available for six or seven engine specialists to complete simultaneous tear-downs and reassemblies. A test stand with a Clayton dynamometer is used for double-checking all overhauled engines before they go out.

Engine overhauling is considered the heart of the whole renovation job, and veteran mechanics are assigned to this work. In keeping with custom, each mechanic has his own tools, representing often as much as \$500 investment. And each has an assigned floor location and the prerogative of ordering out parts and supplies needed for the work at hand.

The order of business for an arriving engine, after it is taken out of its machine, is for it to be steam cleaned (usually out in the yard), wheeled into the engine shop, given a run on the dynamometer in some cases, and then spotted on the floor under a crane hoist for tearing down.

Disassembly is usually complete—it is found to pay, once major work is necessary. New camshaft bushings and rocker arms are installed throughout. The crankshaft is checked, and sent out to a specialist shop if it has to be ground. Timing gears are checked, and put in proper running. Electrical gear goes to "Charlie," the electrical man in the next room.

Continuing with this thorough

going-over, the mechanic fits wrist pins, aligns rods, assembles cylinder heads for a pressure check, and replaces valves and springs where found necessary.

Somewhere about at this stage the mechanic gets the fuel pump back from a local outside service, and checks and makes necessary repairs on the ejector pump. After replacement or connecting up of hydraulic and electrical gear, the engine is ready for its dynamometer test. Here it is checked at the prescribed rpms for pressures, leaks, and power characteristics.

The overhauled engine gets a coat of paint, but not until its mother machine is also ready for painting.

Transmissions get a similarly thorough routine at the same time as the engine, three mechanics being assigned to this work.

Fuel pumps and injectors are seldom overhauled in the company shop. Service in Hartford take care of these precision units.

Rebuilt engines in limited numbers are carried in stock for hurry-calls from the field, but many engine jobs are for machines brought in for general repair. Small gasoline engines are sent out to commercial shops, but the company prefers to keep complete control of diesel and heavy-duty gasoline engine work. This control has resulted in maximum working hours for machines on the job, and has permitted tracing and fixing re-

(Left): Some of the day's work in the hardfacing room: track rollers and idlers for large excavators. (Center): Automatic welding machine for building up and hardfacing tractor track rollers. (Right): Bench exclusively for roller bushing work.





Steam cleaning with a Mallsbury steamer, in the yard on a cold January morning. (Right): Duplicate dispensing cocks for several lubricant grades—a handy detail in the main overhauling shop.



Another of the engine mechanics, seen in the M-C&S shop.

sponsibility for things that go wrong mechanically. Quality of parts incorporated in the work is under constant vigilance, and tests are run on various items when in doubt.

4. A third major shop room is devoted entirely to welding and hardfacing. Located in an adjacent building, this 60' x 100' area perhaps goes as far as any of the departments in specialization.

Ten to 12 welders with helpers work on a year-around basis, tearing down excavator and other heavy track assemblies and renovating or replacing pads, pins, rollers, idlers, sprockets and other parts. (Another exception to self-sufficiency is tractor track repairs; the tracks themselves are renovated in local outside welding shops.) Despite some standardization in equipment makes, this shop must handle a good many different kinds of items, principally for tractors and excavators. Such units as shovel teeth are hardfaced on the job, but shovel buckets are given hard facing while the machines are getting the "works." Truck frame and body repair, and general structural welding are also done in this shop.

Equipment in the welding shop includes a Leader automatic welder, employed principally to build up D8 and TD24 tractor track rolls



Electrical overhauls are made here by a man whose specialty is diagnosing and curing ailing generators, starters, magnetos, light plants, etc.



These bins hold renovated and tagged generators, starters, etc., ready for reassignment.

and idlers; a Miller 600 amp arc welder for spot work; three drill presses; a 250-ton press for rollers and other work; a power hack saw, threading machine, bench grinders, and related equipment including hand-held grinders and buffers.

A separate bench with specialist assigned is reserved for renovating roller cones, including fitting out with new bronze bushings (see photo).

Four electric welders on wheels (Lincoln, and Hobart) serve the general floor area.

Hardfacing holdup is done "all out" as an M-C&S policy, in the belief that it pays in longer machine service and lower costs. Whereas some contractors, for example, won't bother to rebuild rolls, M-C&S makes tractor and other track rolls go through three jobs on the average. On hand, built up and ready for reinstalling on a particular day, were International TD24 tractor rollers, track rollers for a Manitowoc 5-yd. shovel, and other units waiting transport across the yard to overhauling bays.

A well equipped blacksmith shop and forge occupy a room just off the welding shop. Forge and welding work are synchronized in renovating heavy excavator tracks. The tracks are brought in by trailer

*Continued on page 147*



A row of tool cabinets, the pride of the engine and heavy-overhauling mechanics.



Kardex files where records are kept on the mechanical history of every Merritt-Chapman & Scott machine and on the thousands of items of parts, accessories, supplies and materials needed in the firm's mechanical program.

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**ROADS AND STREETS, June, 1960**

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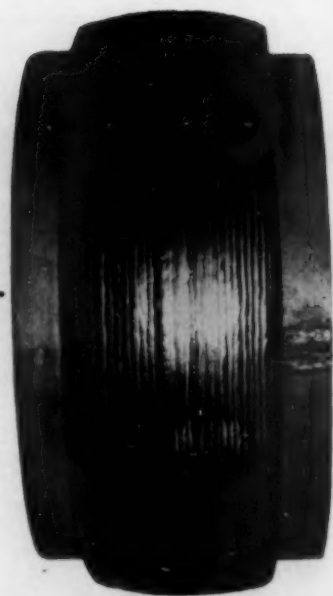
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# SHOVEL ROLLS

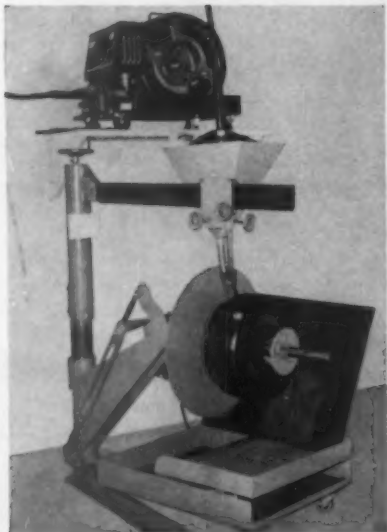
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with **STOODY ALLOY WIRES**

*... by either Automatic or  
Semi-Automatic Welding*



*Shovel roll as rebuilt with Stooddy wires.*



*Semi-automatic welder  
with positioner.*

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rebuilding a shovel roll.*



*Typical manual semi-automatic  
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## PAPERWORK IMPROVES ANALYSIS

*Continued from page 63*

Therefore, it is not a good practice to place too much reliance upon a single intense sample or study. It is actually better to make a series of spot checks in order to ascertain the range of production rates and the variables which may affect such rates.

In summing up timekeeping data, there is one last point which was mentioned by a reader of *ROADS AND STREETS* that bears repeating. Due to continuous changes in highway and airport design, improvements in equipment and methods, the needs for certain types of job information are bound also to change. The results of such changes make it imperative that every one who has anything to do with obtaining job records should be alert to these changes, and also should make a point of entering the effects of these changes in the records. This is to provide a more accurate understanding of the effect of these changes on the cost picture.

For this month's article on Cost Controls, we shall continue our discussion of the accounting functions of a typical roadbuilder. This we'll do by taking a closer look at the "path of paper" made up of timecards, shipping tickets, invoices, receipts and records of all sorts which go along with every job.

The typical roadbuilder is constantly confronted with a large and steadily growing volume of what, for lack of a better name, is called "paperwork". Some of this is the result of his own desire to know more about his own operations. Likewise, another sizable portion is produced by the desires of the public bodies which regulate and tax him, to also know more about how he is doing. The balance of a contractor's "paperwork" may be regarded as being functional and required in order to indicate the amount and sources of expense and income.

In this article we shall be concerned with developing a valid approach for handling paperwork and whenever possible keeping it at a minimum. To do this we'll analyze this very basic subject by developing answers to the following questions:

1. How much paperwork is necessary?
2. How can paperwork be reduced?
3. How can duplication of paperwork efforts be detected and eliminated?
4. How to get more information from paperwork?
5. How much paperwork (i.e. records) should be stored?

Now let us begin with the answer to the first question.

### 1. How much paperwork is necessary?

Regardless of the size and nature of a contractor's operations, he cannot avoid a certain amount of paperwork, if he intends to stay in business with the hope of making more than wages for himself and the use of his equipment.

Any contractor must maintain records which show his expenses or disbursements covering at least the following items:

1. Labor and its related charges as required by law

and also in some cases, by union agreements.

2. Supplies incorporated in his finished products.
3. Services by others (example: sub-contractors).
4. Equipment and maintenance and transportation charges.
5. Other property, both real and personal.
6. Utility and insurance charges.
7. Reserves for depreciation, expansion and taxes.
8. Licenses and taxes assessed on the business or the individual contractor if he is the business.
9. Miscellaneous operating expenses.

There are instances of where, for a time at least, some contractors have carried all of these details in their heads. However, there is growing tendency by owners and agencies to require that contractors be licensed, able to furnish bonds, have good credit references and other similar qualifications. The day of the man who operated from his hat is disappearing.

In addition to these records of expenses, a contractor will also record his sources of income. These were discussed in the second article of this series (in February). Basically, these records cover the following:

1. Payments for work in progress.
2. Payments for work completed.
3. Payments for the sale of services or assets.

The accounting systems used by many construction companies—especially the smaller operators—are often built around and limited to covering the above items in as simple a manner as possible.

The accounting departments of such firms will make a practice of avoiding any more detail than regarded as necessary to show the current financial status of the firm. It is often felt by the management of such companies that their volume of work does not justify the added expense required for preparing a cost breakdown on each job handled by the company, let alone an analysis of the operating costs for each major item of equipment.

Frankly, there is a considerable amount of reason in this attitude. Take the typical case of where a small company is engaged in a very repetitive series of operations or jobs, with the same limited number of men and not too much equipment. There is usually not a great deal of justification for expanding the accounting function beyond that of "balancing the books". This is especially the case if an appreciable increase in accounting or bookkeeping costs would be required.

On the other hand, if a company is engaged in a large variety and volume of operations, or if it must maintain a competitive position by continuously watching its production and equipment costs, then the added expense of further accounting detail is often a well warranted cost.

From this it can be seen that there is a bare minimum of paperwork which confronts every roadbuilder. Increasing it beyond that point depends on the possibility that increased profits and opportunities for expansion more than justify the additional cost.

### 2. How can paperwork be reduced?

This is the Accountant's perennial problem. There is no definite answer because the nature and volume

of paperwork processed by construction companies will vary with each individual firm. However, the following general suggestions are based on successful experiences in reducing unnecessary paperwork.

1. Determine the firm's basic paperwork requirements and classify all paperwork as either basic or extra. Then classify the extra paperwork according to the divisions of the company which make use of it. Ask the heads of those divisions how much of that paperwork they could have eliminated.

2. Examine the frequency with which data from extra paperwork is employed. For example continuous operating cost studies on seldom-used equipment can often be replaced by making a periodic review of such operating costs, with an appreciable savings.

3. Do not hesitate to confer with other Accountants or Comptrollers in order to compare notes on how to "trim the fat off of paperwork". This is a common problem in the industry. A mutual exchange of ideas regarding it will help everyone.

3. How can the duplication of paperwork efforts be detected and eliminated?

This question was not meant to imply that accountants and bookkeepers are not objective about their work. As a group they are always interested in improving the value of their services, and at the same time finding ways to increase their output of data. An accountant's biggest weakness however often appears to be one of self-expression when it comes to selling the company on modernizing its accounting methods.

Once duplication of paperwork is located, it is usually not too hard to eliminate. Two places where duplication is often found to exist are in posting operations and cost analysis of nearly similar items.

Regarding the first or posting operation, the following methods are available: punched basic data cards which permit mechanical transfer of data; multiple posting machines (machine bookkeeping); or compound accounting forms such as the Timemaster System which appears to be very good for many contractors.

In the case of cost analysis of nearly similar items, this may be the result of cost analysis work being done both at the project site and at the home office. Or it may be just the result of having started two separate cost studies which have been permitted to proceed before any one realized that only one was actually required.

Lastly, one other place where paperwork can also be reduced is in the matter of reducing the number and routing of paper forms, when such forms must be used in, say, the transfer of people or supplies and equipment.

4. How can you get more information from paperwork?

It has been said that "paperwork breeds paperwork". This is often true. On the other hand, it is also possible to obtain more information from paperwork than that which the paperwork was originally designed to provide.

Basically, this involves a broader analysis of the existing paperwork. Throughout this article it has been inferred, and how it should be bluntly stated,

## **Prestressed Concrete 6th Annual Convention**

The 6th Annual Convention of the Prestressed Concrete Institute, carrying the theme: "Prestressed Concrete, Key to Creative Architecture and imaginative Engineering," is scheduled for September 27-30 at the Statler-Hilton Hotel, New York City.

Registration fee for the convention is \$35.00 plus \$6.50 for scheduled luncheons. For full details write: Norman Scott, Executive Secretary, Prestressed Concrete Institute, 205 West Wacker Drive, Chicago 6, Ill.

that a continual questioning of the value and necessity of all forms of paperwork is a good thing. Regardless of whether the paper work consists of the accounting records and detail, or the timecards and similar data which are used to substantiate those records. It can safely be said that the perfect form has not yet been developed. (Although there have been some very good tries in that direction. Ed.)

Therefore, one of the duties of an Accounting Department is not only to provide accurate records but to continually review them in the light of current experience—in order to see if or how the records can be modified to provide a better analysis of current operating conditions.

Change (and the ability to change) has long been a keynote of the roadbuilder. Certainly there has always been a willingness to keep abreast of these changes in most roadbuilder's Accounting Sections.

5. How much paperwork (i.e., records) should be stored?

There comes a time when a certain amount of paperwork no longer needs to be kept in the active files. But, because of the historical or even sentimental value, it is felt that old records should be kept. Well, actually, the grim fact is that storage is definitely expensive. Many times in the case of older companies, record storage can become a very costly question.

The general answer to this question is of course, "only those records which may be subject to review". But in a broader sense, this also means that the records from any project which cover actual cost and performance of specific job items should be kept until they have been transferred into a permanent master record or microfilmed. If this transfer of data is accomplished before the project has been completed and accepted, then the original data should be kept until after any time limits for renegotiation have elapsed.

This also means that it is good practice to have all the receipts, time cards, estimates and other calculations and memos relating to any disputed pay items or quantities kept on hand for ready reference until such matters have been settled.

In this brief article we have presented a general discussion of the important subject of "paperwork" as it applies to the cost control problems of a typical roadbuilder. In the next article we shall present a review of both the standard and newer techniques for analyzing cost data.



## CONTRACTOR OVERHAULS

*Continued from page 141*

through an end door, lifted to the floor, taken apart with the help of a hoist, and the pads carried to various work stations for necessary welding repair.

5. A machine shop is located in a compact central area between the main overhauling area and the engine room. Lathes are on hand in several bed sizes; and there is a shaper, milling machine, valve refacer, cylinder honing machine, metal saw, and small drill press.

6. The machine shop merges into a highly specialized area for electrical overhauling. This corner, caged in for security, has a small lathe, electric hand-held drills, and other equipment needed for precision work on armatures, commutators, etc.

A stock of rebuilt generators, starters, magnetos and similar units is kept in bins, tagged with such names as Delco-Remy and ready for quick send-out. The bins also carry rebuilt solenoids, fuel pumps, carburetors and other renewed units or sub-assemblies awaiting reuse, as well as new stock.

The electrical repairman is one of the more specialized fellows. "It takes an expert to look over an electrical unit and know what to do first," as a foreman put it.

The M-C&S complex of large projects runs heavily to tractors, shovels, drills, compressors, and bottom and rear dumps, plus some scrapers and paving equipment units. Heavy repair jobs in a recent year have run to about 850 annually, some 60 percent being major tear-downs. Seven heavy Mack-drawn lowbeds and other trailers work a steady shuttle out of East Hartford, supplementing rail shipment, to keep the equipment moving between field and shop and out again.

The economics of this business, what with income tax depreciation and other ownership factors, are such that long transport is often found feasible. For example, rock trucks from the Niagara Power Project were recently overhauled in East Hartford and shipped by rail clear across the continent to the firm's Cougar Dam project in Oregon, or by water to its cut-widening project on the Panama Canal.

## W. Virginia Commission Honored by NHUC

The West Virginia state road commission was presented an Award of Distinction by the National Highway Users Conference at the Eighth Highway Transportation Congress held recently in Washington, D. C. The award was for "certain outstanding features of the Commission's 1959 report, 'An Enlarged Program of Highway Planning and Construction'."

The report now honored was presented to the 1959 state legislature by governor Underwood and state road commissioner Patrick C. Graney in the 1959 legislative session. It outlined the administration's ten-year, long-range highway program based on needs. The award certificate was presented to Colonel George E. White, Jr., deputy commissioner and state highway engineer, who accepted in behalf of commissioner Graney.

*In Georgia, too...*

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### Check these other recently-announced LW grader attachments

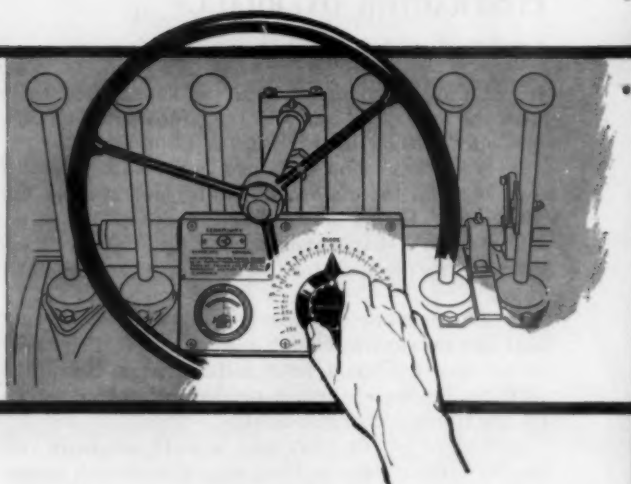
**ATECO Ripper**—This mainframe-mounted ripper breaks up heavy and tough materials fast. Operator has complete and accurate control... ripper operates through the grader's hydraulic system. Available with several different shank shapes, for various jobs, and can be mounted to "660" or "550" graders in the field, or purchased as optional equipment with new graders.

**Jebloader and Jebco Elegrader**—These LW grader attachments plow and cast material up to 1750 cu yd per hour. Load into trucks at up to 800 cu yd per hour. LW graders can also be used as the main unit in the new Jebco Seal-Coater.

### You also profit by these proven LW quality features

- 12-speed transmissions (8 forward, 4 reverse), plus 3 optional creepers, give you more full-power gear ratios. POWER-Flow® models (145 and 190 hp) have torque converter, infinite gear ratios, with speeds to 27.4 mph.
- Big blade-circle... 63" diameter for steady blade control.
- Full-sweep visibility... operator can see all critical areas of blade, plus road ahead... sitting or standing. He also has "handy-reach" power-controls.
- Quick, easy moldboard tilt-adjustment... operator can change blade-pitch in minutes.
- Super-strong one-piece frame, for rigid support, trouble-free performance.
- Full-floating drive-axle and anti-friction power train, for less wear, less maintenance.
- Welded bar-and-plate front axle (the strongest built!).
- Rubber-mounted engine, to minimize vibration.

**There's a size LW grader to fit your every need, 85 to 190 hp. We will give you complete facts and a demonstration.**



**H**ere's an important attachment that makes LeTourneau-Westinghouse graders *still* more profitable. You can now equip your LW grader with the Preco "all-transistor" automatic blade-control. This attachment makes it possible to *automatically* maintain desired cross-slopes while grading.

### Accurate grade in 50% less time

Your operator sets the Preco "dial" for any desired slope and puts either end of the blade (usually the



You can use the Preco control profitably for every grading job from the roughest to finest. By doing automatically the important job of maintaining the desired transverse slope, it makes the operator's job easier — permits him to work faster, more accurately for you!

**NOW AVAILABLE...**

# ***PRECO* automatic blade-control for LW graders**

heel) under automatic control. He is then free to concentrate on his reference line... forgetting about the automatic end of the blade, because it will *always* be at the right spot and the right slope. Result: he gives you a finished grade in up to *50% less time!*

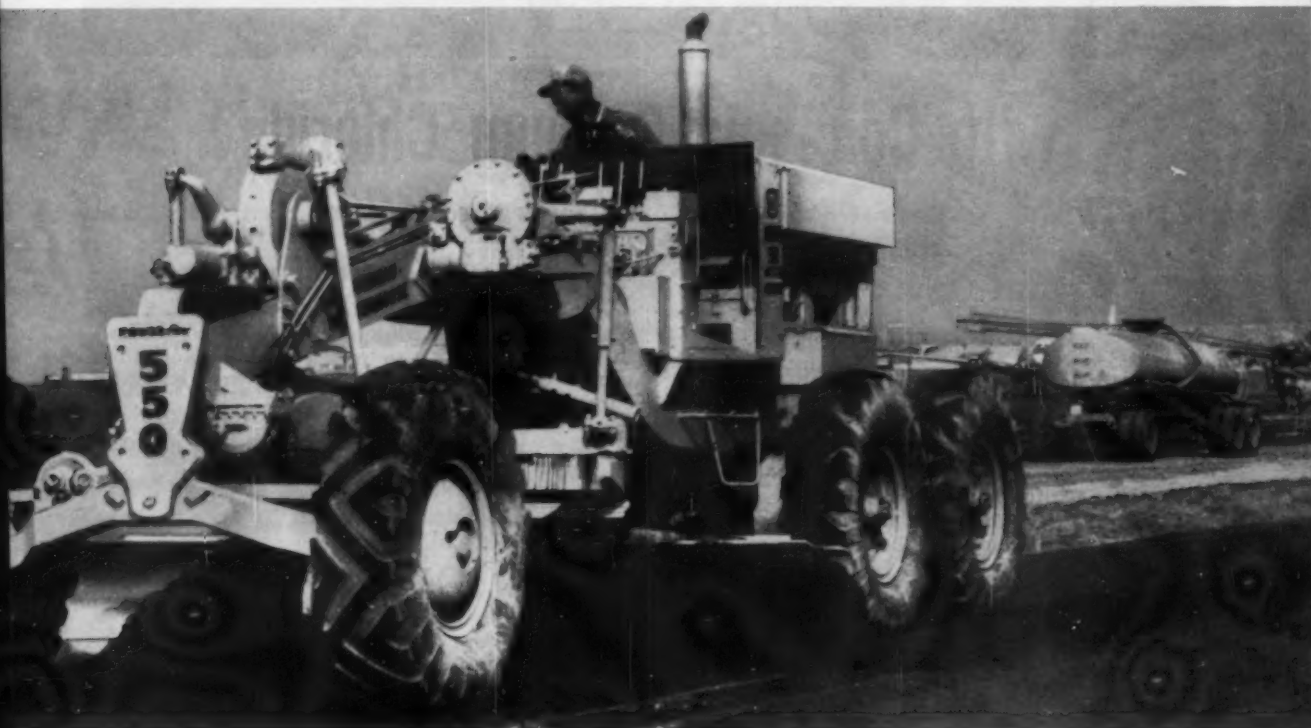
Use of the Preco blade control on your LW grader also cuts construction costs. Intermediate grade stakes, for instance, can be eliminated or reduced, where state practice permits. Labor costs for auxiliary help, such as

grade-checkers, are reduced. You also save material by insuring a smoother and more accurate finished surface.

#### **Installed easily and quickly**

This automatic blade control can be installed easily in a few hours on any new or used LW grader. Extensive performance tests prove that the control is *far more efficient on LW graders* than on any other machine. The unit never interferes with any normal grader operation.

G-2291-DC-2

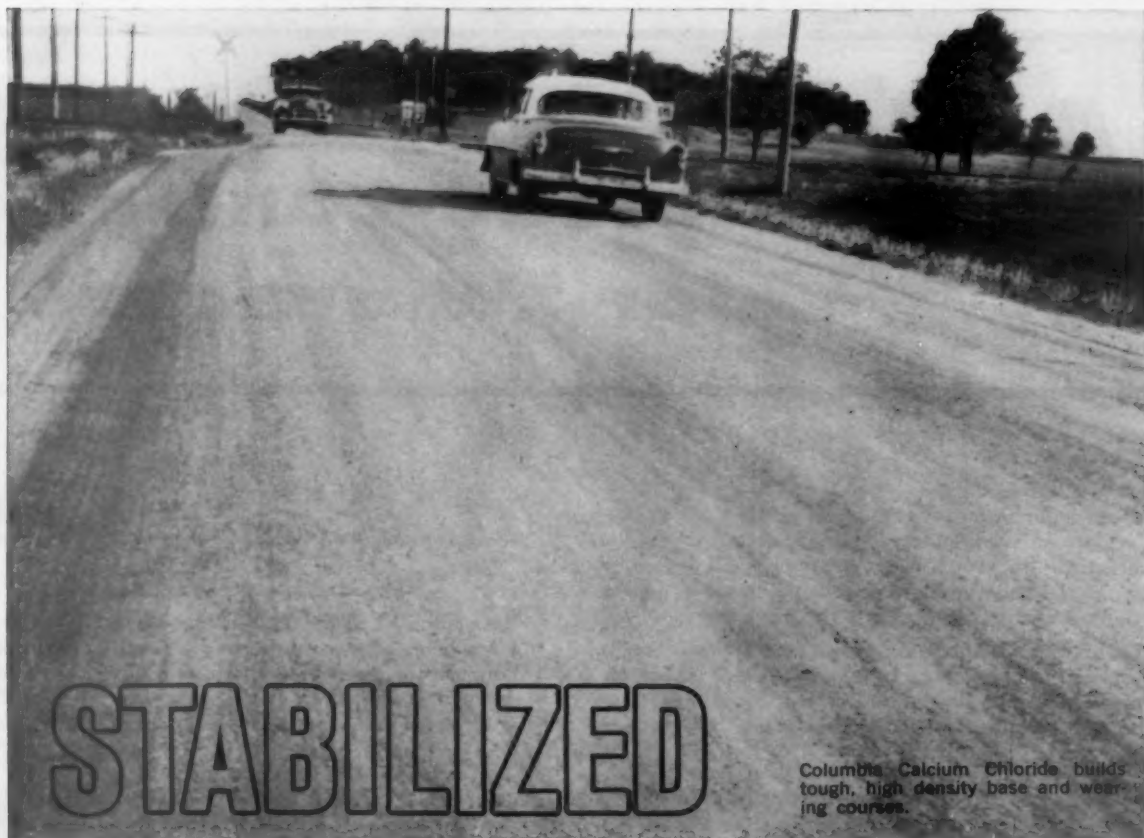


**LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS**

*A Subsidiary of Westinghouse Air Brake Company*

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**Where quality is a habit**



Columbia Calcium Chloride builds tough, high density base and wearing courses.

## with Columbia Calcium Chloride

What makes a good road? The answer starts with a durable, dense-graded aggregate base stabilized with Columbia Calcium Chloride. The addition of Columbia Calcium Chloride gives these significant effects on stability:

- 1. UNIFORM MOISTURE CONTROL DURING COMPACTION** — Even during periods of low humidity and high temperature, Columbia Calcium Chloride resists evaporation and permits maintenance of optimum moisture during compaction, thus giving higher and more uniform density.
- 2. LESS COMPACTIVE EFFORT REQUIRED** — Tests show that by using Columbia Calcium Chloride, greater density can be obtained with one-half the number of rollings.
- 3. LESS BINDER REQUIRED** — Reduces the percentage of binder soil required, an important consideration in controlling frost damage.
- 4. CONTROLLED CURING FOR INCREASED STABILITY** — Columbia Calcium Chloride assures high structural stability because it controls drying rate during compaction and curing periods.
- 5. DUST FREE SURFACE** — Keeps road firm during and after construction, establishes a smooth-riding, safe-wearing surface.

**6. FROST PROTECTION** — Effectively reduces detrimental frost action.

### 7. ADAPTABLE TO BOTH PLANT AND ROAD MIXES

Put Columbia Calcium Chloride to work on your roads. It adds extra miles of trouble-free performance in bases and wearing courses. For more information, contact our nearest District Office or write our Pittsburgh address.

*You'll like doing business with Columbia-Southern*

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chemicals

COLUMBIA-SOUTHERN CHEMICAL CORPORATION • A Subsidiary of Pittsburgh Plate Glass Co. • One Gateway Center • Pittsburgh 22, Pa.  
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Ready for backfill. The Armco Multi-Plate grade separation shown here was one of four such structures erected on the Rawlins-Sinclair Road in Carbon County, Wyoming.



How the finished underpass looks today.

Diagonal tie rods were installed throughout the first underpass but were later found to be unnecessary.

## Economical Grade Separations for Low-Density Roads

By C. E. Gattis

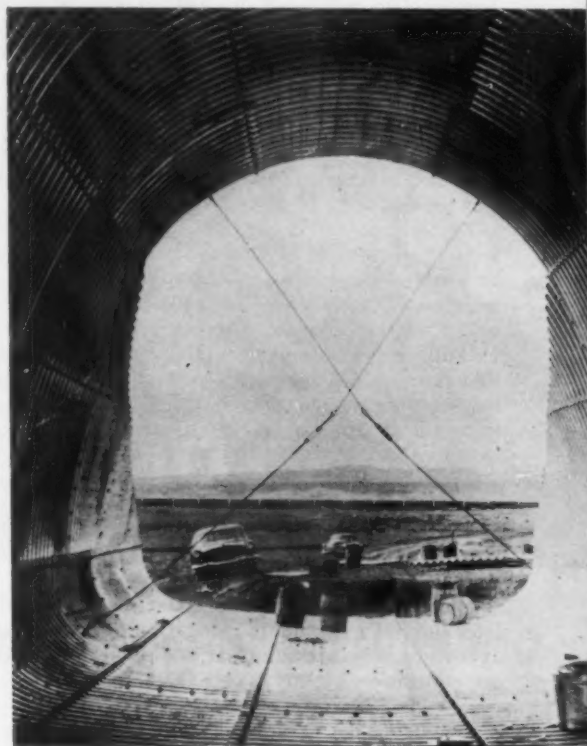
Resident Engineer, Wyoming State Highway Department

**H**ow to attain low-cost grade separations and stock underpasses on little traveled roads in the Great Plains area has been a growing problem.

For such a separation on the Rawlins-Sinclair Road in Carbon County, Wyoming (U.S. 30), the state highway engineers collaborated with the manufacturers to consider the practicality of a corrugated metal structure. The end product of their study is one of the largest corrugated plate structures ever erected. Three units each 17'3" by 16' were specified by the Wyoming highway department.

The first Armco Multi-Plate unit, 184 ft. long, was erected at a location where it was necessary to sub-excavate the original shale formation and bring in about 12 in. of backfill material. Backfill consisted of a sandy soil that met the Wyoming state highway classification for the foundation. This material was compacted in place with a 50-ton pneumatic roller, while the erection crew shaped the foundation with a template.

Since it was the first installation of this excep-



tional size—wide enough to squeeze two cars through side-by-side—some doubt occurred as to whether or not interior bracing would be necessary to prevent distortion during backfilling. So when the structure was completely assembled, two diagonal steel tie rods fitted with turnbuckles were installed in each section but left loose. Careful measurements of the vertical and horizontal diameters were taken throughout the structure before tamping operations began.

Backfill was placed in a trapezoidal section, the

base width being 53 ft., using about 2,300 cu. yd. of backfill. In view of the large backfill job, the contractor brought in a 175-cfs compressor, two pneumatic tamping units with 6 in. diameter heads to use in the corrugations, and one vibrating tamping unit. All backfill material was pre-wetted before delivery in scrapers. Deposition was outside and parallel with toe of slopes of the backfill section on either side of the structure. A motor grader bladed the material in place ready for the compacting units. Tamping by hand-held units was confined to an area 5 ft. in width on each side of the conduit, the remainder of each layer was compacted with a 50-ton pneumatic tired roller.

The hand-held vibrating tamping units had not been used in the Rawlins area before this job; so some experimenting was necessary to determine how many passes would be needed to obtain a minimum density of 90 percent of optimum. It was learned that three passes were required for a 5-in. layer of loose material, while a 4-in. layer required only two passes. The contractor decided to place 4-in. lifts because additional passes with the tamping unit did not increase the density of compaction obtained.

Backfilling and tamping proceeded until about 3 ft. of backfill material had been placed on each side; then backfilling operations were stopped until the fill-section on either side was brought level with the structure backfill. Then backfilling on the conduit was resumed.

Density tests taken in the mechanically tamped section averaged 94 percent of standard compaction at average 75 percent of optimum. Density tests were taken in each 3-ft. lift on both sides. A close watch was kept on the diagonal metal ties during backfilling, yet no uncontrollable elongation of the structure was apparent. Consequently, it was not necessary to use the diagonal metal ties and they were not installed on the remaining structures.

When backfill was completed over the structure, a cover of 3 ft. of compacted earth was placed over the north half of the conduit. This area was used by the contractors as a haul road to complete the fill section. Large scrapers loaded to capacity passed without any further movements in the structure.

Additional measurements taken several months later showed a maximum elongation of the vertical axes to be 2 in. maximum at one point, with average elongation slightly over 1 in.

THE PUERTO RICO DEPARTMENT of public works has awarded a contract to the engineering firm of Lockwood, Kessler & Bartlett, Inc., for the design of major portions of the proposed San Juan urban arterial system. The project is estimated at \$18 million.

The arterial system will consist of a series of limited access highways to relieve congestion in downtown San Juan and carry traffic to and from outlying districts. The consultants' work, covering about eight miles, will include the northerly and southerly portions of the De Diego Expressway, the Las Americas Expressway and the 1/3-mile-long Martin Pena Channel Bridge.

## Letters

To the Editor:

Your staff article in April on California concrete highway jobs done with slip-form pavers is noted with interest.

Our experience with slip form machines, designed canals and other construction work over the past 20 years is reflected in the paver which our firm has supplied to the Ball & Simpson job described.

We feel that the readers of Roads and Streets should understand some of the fundamentals of this development. These were outlined in a paper, "The Integration of Slip-form Paving on Highway Work," which I presented at the recent Highway Engineering Conference, College of the Pacific, Stockton, California. Copies of this paper are available on request to me or to Professor A. Diefendorf of the school.

Our machine blends batches received from the two pavers, by means of the distributing box. Homogeneity is also furthered by the machine's system of vibration.

Control of line and grade are accomplished by grade wire and automatic controls, so that irregularities of the subgrade need not affect the surface smoothness of the pavement. These refinements we consider important to good results. The automatic guidance also vitally concerns both the engineer and the contractor in helping keep paving overrun to close control.

R. M. Guntert

President,

Guntert & Zimmerman Const. Div., Inc.,  
Stockton, California

To the Editor:

I have read with much interest and appreciation various articles on the aspect of mixing in quality control of bituminous mixtures. Your publication, I believe, has published reviews on the subject.

The dry mixing time is something to which I have given considerable thought and experimenting. It is my firm conclusion that the proper name for it would be Dry Separating Time, as that is exactly what is accomplished. Stop the mixer after a dry run of a few seconds and you will find it well separated, the coarse on top and the 200 on bottom.


One way I found to help in getting the materials well distributed throughout the mass or batch is to weigh them into the hopper in reverse of the usual order—coarse first, then the other sizes—then begin the spray as soon as the material starts into the pug-mill. This lets the fines come in last, and hence they will be well distributed throughout the mass. The coarse material will be well coated and there will be no "balls" of fines and asphalt.

C. E. Edge

Hardin Construction Co., Inc.,  
Glencoe, Alabama

# REX SELF-WIDENING SPREADER

...latest addition to the complete  
Rex concrete paving line



**LEADERSHIP  
IN ACTION**

**NOW...Rex cuts the high cost of tapered-lane paving and street work**

SOLVED are all your street and tapered-lane concrete-paving problems. This new Rex Spreader is custom-designed for this work...and the *only* machine today combining self-widening with all-mechanical operation.

Now you can do *one-machine, one-operator* spreading and finishing for high-quality surfaces every time. Advanced Rex telescopic design enables you to range from 10' to 15' or 12' to 18½' slab widths in a continuous operation.

The large Rex spreading screw combines maximum spreading-compacting action. The strike-off levels to grade. The big, rear oscillating screed provides the excellent metering results that reduce hand finishing to an absolute minimum. For fast, easy job-to-job moves, it can be equipped with optional hydraulic transportation rig with rubber-tired wheels.

For bid-winning advantages and higher per-job profits, by all

means get the *complete* picture of this important Rex development. See your Rex distributor or write for catalog: CHAIN Belt Company, 4652 W. Greenfield Ave., Milwaukee 1, Wis. In Canada: CHAIN Belt (Canada) Ltd., 1181 Sheppard Ave. East, Toronto. Distributors in all principal cities of the world.

# REX<sup>®</sup>

**CONSTRUCTION MACHINERY**

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## Allis-Chalmers Selects Twin Disc Torque Converter for TL-14's Tractomatic Transmission

EIGHTEEN YEARS AGO Allis-Chalmers introduced the first torque converter drive in a crawler tractor. That original unit featured a Twin Disc converter, and the same is true of many present-day Allis-Chalmers construction machines. For the optional Tractomatic Transmission in the new TL-14 Tractolader, Allis-Chalmers engineers have once again incorporated a Twin Disc Torque Converter.

This transmission provides the key advantage of power shifting in a simpler, more economical unit. A direction control lever on the steering column actuates forward and reverse clutches hydraulically — changes di-

rections without clutching, shifting gears, or stopping the machine.

*Since reverse speeds are 30% faster than forward, reversing the machine automatically increases its speed.* This eliminates the usual necessity of shifting gears manually to achieve the same effect.

The Tractomatic transmission has four speeds in both forward and reverse. On short haul loading and stockpiling jobs, it is seldom if ever necessary to change speeds once the proper ratio is selected.

A Twin Disc Single-Stage Torque Converter is an integral part of this transmission. Besides increasing

torque automatically as needed, the converter permits rapid clutch engagement and absorbs the shock of the shift in its whirling fluid.

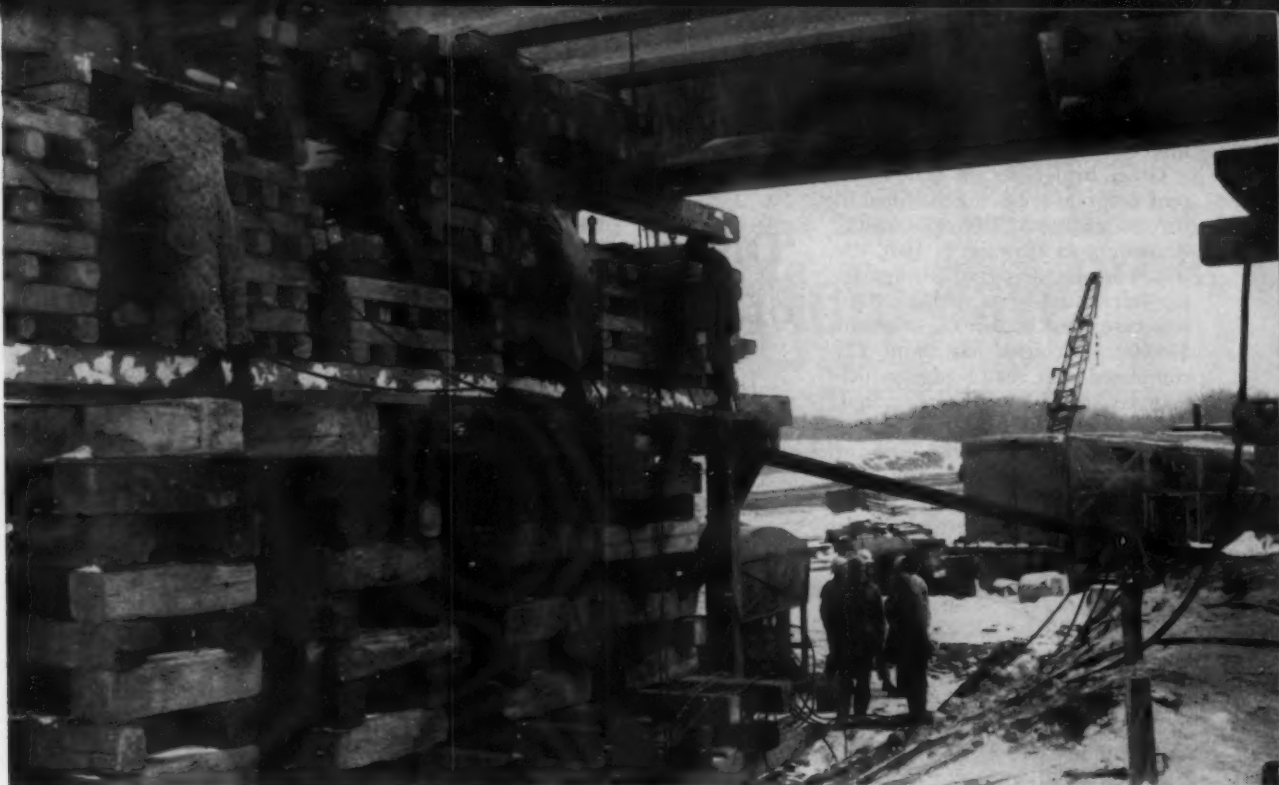
A test of the TL-14 Tractolader at your Allis-Chalmers dealer will demonstrate why so many of America's leading earth-moving equipment manufacturers are standardizing on Twin Disc Torque Converter Drive.



**TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • Hydraulic Division, Rockford, Illinois**

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Using hydraulic jacks, moving and shoring experts brought each panel of beams up simultaneously.



Sights like this may be common in many states as highway departments modify their "I" bridge design to meet new Defense clearance requirements.

## Heavy Beams Raised to Give New Clearance

**T**he nation's first highway bridge raising to provide greater vertical clearance for trucks carrying missiles was done recently in Michigan. The bridge is one under construction on Interstate 94 (US 12) east of Jackson.

Using hydraulic jacks, crewmen raised precast concrete beams of the partially completed deck on four sections. The 1'9" raise changes the

clearance from 14'6" to a new 16'3". The prestressed beams and diaphragms involved in the raising weigh nearly 500 tons.

The six beams in each of the four spans, tied together by the diaphragms, were raised together. After the raising, concrete bolster blocks were cast on the pier and abutment seats to support the beams at the higher elevation.

The decision to raise the bridge followed the issuance of new federal regulations requiring greater clearances. The Bureau of Public Roads order, given at the request of the Defense Department, requires that overhead structures on rural sections of the National Interstate and Defense Highway System provide a minimum of 16 ft. clearance. Michigan is providing

an extra 3 in. to allow for a snow layer or for future resurfacing of the under roadway.

Other bridges in the state's current program are being modified in the design room before awarding. According to Howard E. Hill, the state highway department's managing director, raising the 210-ft. structure here pictured cost about \$18,000. Michigan has about 275 completed state road bridges which may be affected by the new regulation.

The moving specialist firm of C. A. Johnson and Son, Inc., Detroit, raised the beams for JRAMN, Associates, of Lansing, under subcontract from D. J. McQuestion & Sons, Dearborn.

### Film Presents Solution To Traffic Congestion

"Millions On The Move," a 16 mm sound and color film on America's traffic congestion problem, is available on free loan to community groups located in or near (75-mile radius) cities of 75,000 or more.

The film asks the question "Will you continue to pay the high price of traffic congestion, or will you live modernly with coordinated public transportation? And the price we pay is high, costing Americans billions of dollars each year in depreciating business and real estate values, lost man-hours and the immeasurable personal cost and discomfort. The key to removing the congested, horn-honking traffic, as this film points out, is the movement of people—not vehicles. Several dramatic examples show how rapid transit vehicles, out-laying parking areas, and modernized rail and bus facilities have stimulated the flow of traffic in several cities.

Presented by General Electric Company, the film was produced by Wilding, Inc. Prints may be obtained from any Association Films' distribution center: Ridgefield, N.J. (Broad at Elm); La Grange, Ill. (561 Hillgrove Ave.); Dallas, Texas (1108 Jackson St.); and San Francisco, Calif. (799 Stevenson St.).

## Labor Law

### 'Discriminating' Says AGC of Secondary Boycott Proposal

A bill to legalize the secondary boycott in the building and construction industry would spread labor unrest and disputes. It "would be like turning the clock back to 1947, and invite the return of the abuses which then existed and which brought about the passage of the Taft-Hartley Act."

So said a spokesman for the nation's general contractors, appearing recently before the Labor-Management Relations Subcommittee of the House Education and Labor Committee.

The proposal, H.R. 9070, he said, would destroy the ban on secondary boycotts written into the Taft-Hartley Act by Congress after extensive hearings, and overturn the Supreme Court's decision in the so-called Denver Building Trades Case of 1951 in which it upheld the legality of this section outlawing secondary boycotts.

The spokesman against this bill was Frank J. Rooney, Miami, Fla., a past president of the Associated General Contractors of America, and chairman of its Labor Committee. He asserted that if such legislation were enacted, "much of the good accomplished by the passage of the Labor Reform Act of 1959 would be nullified. It matters little to the construction industry for Congress to have passed a good Labor-Management Reform Law only to have its essential provisions removed by legalizing the secondary boycott."

Mr. Rooney stated the bill "would cause labor unrest and actually encourage strikes and picketing in construction," and "instead of confining disputes to the interested parties, it would spread and involve neutrals with whom the union had no primary dispute."

He noted that the leadership and control of "responsible international labor officials" would be weakened by freedom of local represen-

tatives to conduct what would then be considered a legal secondary boycott.

Among other points made in Mr. Rooney's testimony were that:

The bill's "vague and ambiguous language would appear to encourage the transfer of unlawful disputes and secondary boycotts involving the use of materials and supplies to the construction site."

The rights of the individual employee, referred to as the "heart" of the Taft-Hartley Act, would be removed as far as application of this section to construction is concerned, resulting in "a virtual closed-shop for our industry."

The industry is made up largely of small businessmen with limited capital who undertake unusual risks and uncertainties in construction projects, and "It is not right to inject this additional hazard into business affairs. Any prudent contractor would have to increase the price of his services to the public to take into account the possibility and probability of additional strikes over which he would have no control."

The bill would discourage maintenance by contract and in time boomerang against skilled building tradesmen by legalizing secondary boycotts by industrial unions "who could strike or picket to remove not only the construction contractor, but his building trades workmen from any plant or factory where they might be jointly engaged."

Noting that claims have been made that a union can not lawfully picket an employer on a construction job when there are other trades employed on the same project, Mr. Rooney pointed out, "This simply is not so. NLRB has ruled time after time that the unions may conduct a lawful picket or strike against the employer with whom it has a primary or direct dispute."

**"We looked at our roads... we looked at our budget... then we looked for a solution... and found it in a**



**Moto-Paver"**



New dam construction and new industries in Douglas County, Washington, had jumped traffic on some roads from 100 vehicles or less to as high as 7,000 daily. Many of these roads were in dire need of widening—and resurfacing.

"But," said Pat Thompson, county engineer, "Douglas County is not exactly rolling in 'filthy lucre'. In fact we are so tight fisted that we count our dollars by the penny, and know where each one of them goes. In other words, we watch our costs closely. So—we looked at our roads—we looked at our budget—then we looked for a solution—and found it in an H & B Moto-Paver. It saved us \$2 per ton over the cost of asphalt from a centrally located plant."

Another Washington engineer, Earl Barnwell, of Snohomish County, had one of the most terrific weather problems in the U. S. In some cases he had to "dry out" road-mixed windrows as many as six times. As a result of the savings effected by their first Moto-Paver, Snohomish County expects to buy *two more* such machines.

These are only two of scores of examples that could be given showing how the Moto-Paver speeds the job and cuts the cost on original paving, resurfacing, etc. Moto-Paver has been doing this in many parts of the world—under widely differing job and terrain conditions—for over 12 years.

Moto-Paver is also well adapted for soil-cement stabilization work. Write for complete information.

#### **Also —**

#### **H & B STATIONARY AND PORTABLE BATCH MIX PLANTS**

**Type T**—the last word in batch type plant design and engineering. Available in four standard sizes in capacities from 60 to 225 t.p.h.

**Mobile Batch Plants**—Completely portable—all units wheel mounted. No crane needed for erection or disassembly. Three sizes: M20 (20 to 40 t.p.h.), M40 (100 to 140 t.p.h.) and M60 (160 to 225 t.p.h.)

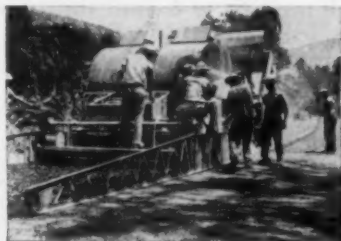
**Medium Capacity Plant**—Model CH plants will produce from 30 to 50 tons of hot mix per hour. Ideal equipment for medium size cities—for resurfacing, maintenance and new construction.



**Moto-Paver**  
on Alps Mountain job, Switzerland.



**Moto-Paver**  
on Rome, Italy, Airport job



**Moto-Paver**  
on road job in Central America

**HETHERINGTON & BERNER INC. • 701-745 Kentucky Ave., Indianapolis 7, Ind.**

**ROADS AND STREETS, June, 1960**

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# Bituminous Roads And Streets

Bituminous features appear  
between pages 158 through 174.

## Some Basic Facts About Emulsified Asphalt

By R. N. Traxler

Research Engineer, Texas Transportation Institute,  
Texas A & M College System, College Station, Texas

**A**sphalt emulsions are dispersions of very small drops of asphalt in an aqueous medium. The droplets usually range in diameter from one to five microns (25,400 microns = 1 inch). A satisfactory emulsion is smooth in appearance and usually brown in color. Emulsions are used in road construction and maintenance, soil stabilization and for various special uses where cold application of asphalt is desirable. Emulsions are easy to handle; for example, when it is necessary to decrease their viscosities, addition of water is all that is required. Asphalts of a fairly wide range of consistency can be emulsified but, most commercial road building, emulsions are made from materials of 100 to 200 penetration at 77°F.

Clay Emulsions. This term includes all asphalt emulsions prepared with an aqueous dispersion

of a mineral. The most widely used material is a special type of clay known as Bentonite, which possesses remarkable colloidal properties. Selection of a suitable Bentonite is based on experience and tests indicating the degree to which the clay can be hydrated. For satisfactory emulsification of an asphalt the alkalinity of the aqueous clay dispersion must be carefully adjusted to obtain optimum peptization of the mineral. Many mineral powders or mixtures have been patented as suitable emulsifiers for asphalt. Among these may be mentioned dry coal, oil shale, portland cement, gelatinous metallic oxides with asbestos, and phosphate minerals.

Asphalt emulsions made with bentonitic clay, when applied to a solid surface and exposed to the air, dry from the bottom up, and not from the top down as in the case of the anionic systems to be discussed below. Thus, since a skin of asphalt is not formed on the

surface, the setting and drying of the emulsion are rapid. Also, the clay left in the asphalt, after the water has evaporated, results in a film that has some improved flow properties. However, the presence of the clay in the bitumen may result in increased water imbibition by the asphalt during service.

Clay type asphalt emulsion is chiefly used in specialty applications. Emulsions made and stabilized by dispersions of mineral powders usually contain ellipsoidal particles of asphalt.

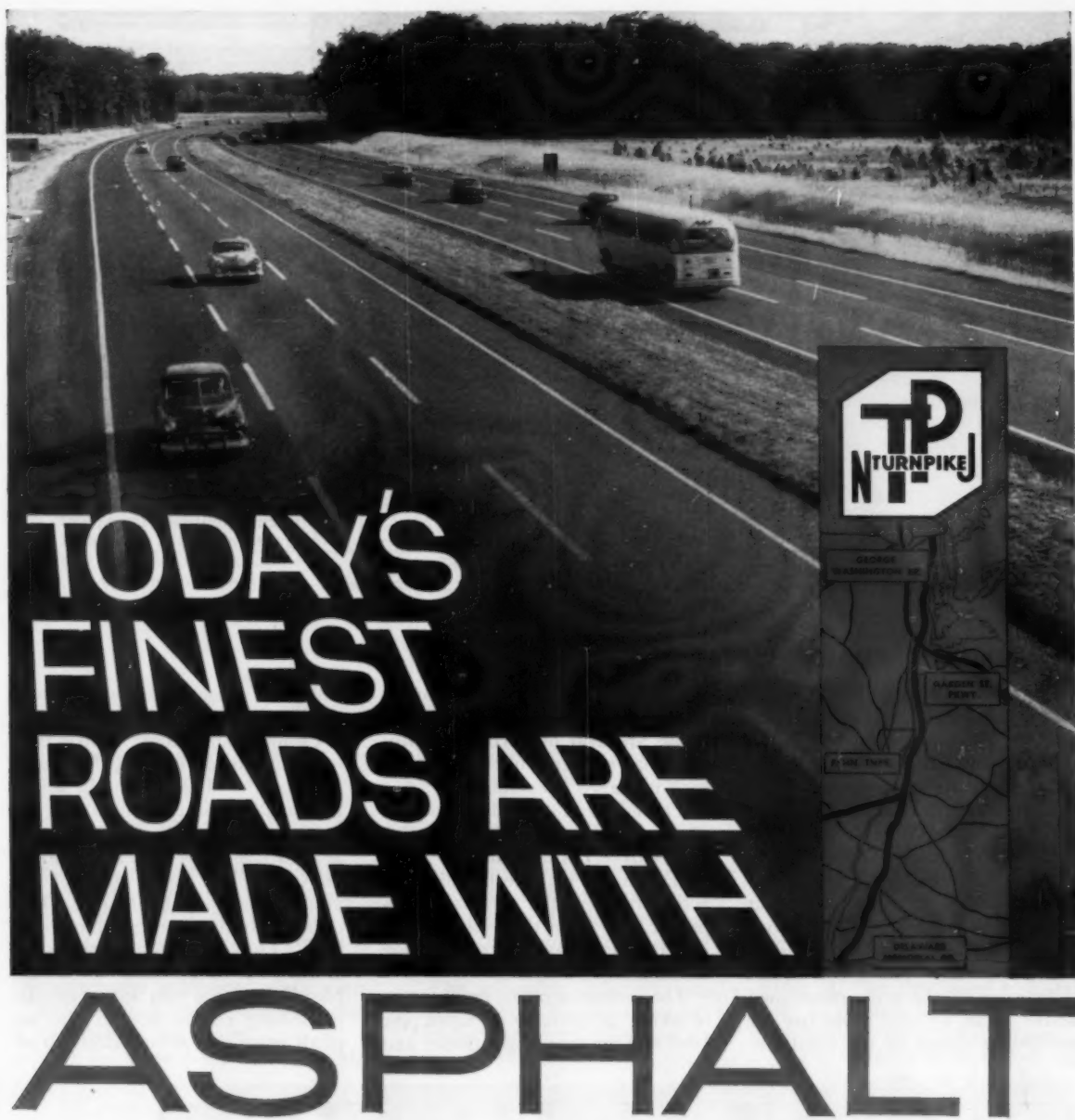
Anionic Emulsions: The term anionic arises from the fact that the surfaces of the asphalt droplets carry negative charges. In these systems the particles are spherical and small in size compared to those in clay type emulsions.

Many different soaps and surface-active materials have been used in aqueous dispersion or solution for the preparation of anionic emulsions. The aqueous emulsifying so-

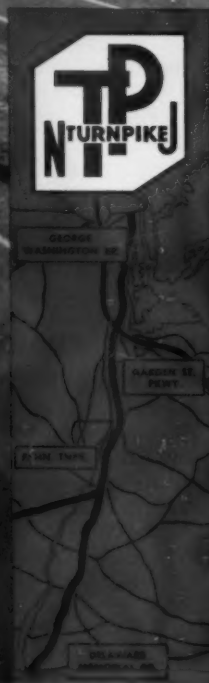
*Continued on page 160*

From a paper, "Emulsified Asphalt," presented at the 34th Annual Texas Highway Short Course, College Station, Texas.





# TODAY'S FINEST ROADS ARE MADE WITH ASPHALT



Asphalt furnished by Esso was used in the construction of the New Jersey Turnpike and saved more than \$46,000 per mile over slab type pavement—and every year will bring added savings through lower maintenance costs. Consider these advantages in your road building plans:

*Unsurpassed quality*—Asphalt produced by Esso is specially refined to give pavements integral strength and flexibility—with maximum strength to resist heavy axle loads and extremes in temperature.

*Faster construction time*—Roads paved in ribbons are completed faster...do not require curing time, forms, and curing equipment.

*Less capital tied up*—Contractors can meet

faster construction schedules and obtain contract payments more quickly.

*Less interruption of traffic*—On new construction as well as in resurfacing or widening of old roads, traffic can be routed over finished work without delay...for greater safety to workmen and motorists.

Any road, street or turnpike, paved with Asphalt costs less to build...costs less to maintain...gives a smoother, quieter ride...gives more miles, safety and comfort for the taxpayer's dollar over slab type pavements. For more information write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.



**ASPHALT PRODUCTS**

**In Industry after Industry... "ESSO RESEARCH works wonders with oil"**



"Emulsion is emulsion"—this outmoded attitude today must be replaced by an understanding of the different emulsion types and grades available in asphalt work, and which are best used for given purposes.

## EMUSIFIED ASPHALT

*Continued from page 158*

lution is usually formulated to possess an alkalinity of pH 9 to 11. Sodium and potassium soaps prepared from the by-products of rosin refining, and the soaps of various complex, high molecular weight organic acids, are used extensively.

To make a reasonably stable anionic emulsion it is necessary that some colloidal material be associated with the soap or be added to the dispersion. The gums found with some of the acids mentioned above serve as the protective or stabilizing agents in the emulsion.

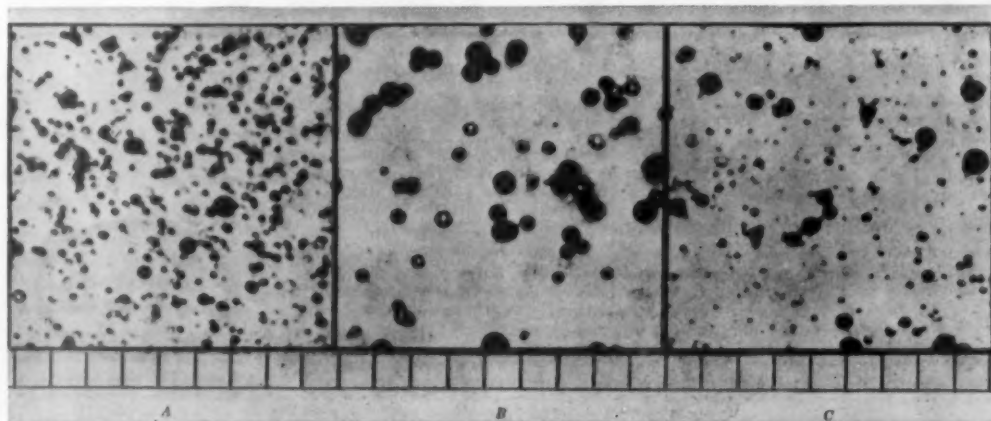
Casein and other vegetable proteins dispersed in the alkaline aqueous phase are also used commercially. The patent literature concerning such materials is extensive.

The addition of acid or the salts of most di- and trivalent metallic ions will break an anionic emulsion. This is because chemical reaction removes the soluble or dispersed soap from the asphalt-water interface and results in coagulation of the asphalt droplets.

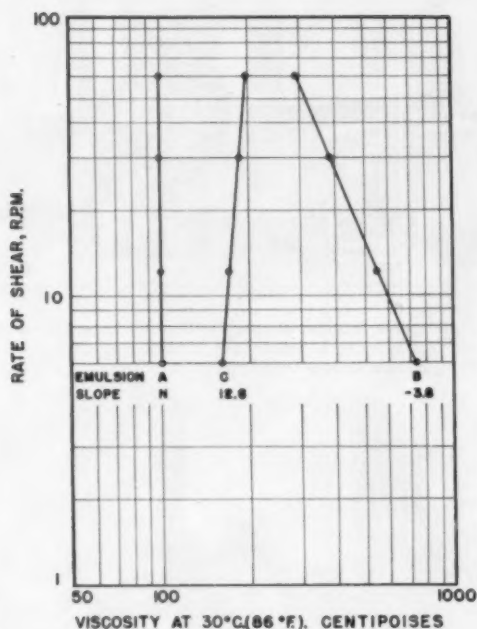
The resistance of the emulsion to breaking is dependent upon the kind and amount of emulsifier and

stabilizer present in the colloidal system.

**Cationic Emulsions:** A new type of emulsion has entered the industry recently. This system, in which the surfaces of the asphalt drops carry a *positive* charge, offers several attractive properties. It was noted above that the water phase of the anionic emulsion is alkaline. The opposite is true for cationic emulsion. Thus, since one type is alkaline and the other is acidic, blending of the two will result in immediate coalescence of the asphalt particles. A manufacturer of



Showing 5 to .005 micron sized globules of asphalt in suspension, and indicating the relationship of globule size to dispersion.



Rheological relationships, as referred to in this review.

both types must handle and store each kind separately.

Mertens and Wright (1) discussed the properties and behavior of cationic emulsions and how they differ from the conventional anionic type. They also classified aggregates used in road building on the basis of their surface charges and remarked that, "Cationic asphalt emulsions, which are positively charged, are used with electro-negative aggregates, whereas anionic emulsions are used with electro-positive aggregates".

It has been pointed out by the

manufacturers of cationic emulsions that such systems have unusual ability to adhere to and hold together even "difficult" types of aggregate. Also, cationic emulsions show rapid initial set; a property of great practical importance, because it minimizes loss resulting from rainfall. An ever present danger in the use of anionic type emulsions is the washing of the emulsion from the stone by a rain.

The following information is taken from a brochure issued by Armour Industrial Chemical Company (2): Dialkyl quarternary Am-

monium Chlorides with "R" groups containing from 8 to 18 carbon atoms (Aquads\*) are being used in conjunction with salts of tertiary amines possessing one fatty alkyl group and 2 polyoxyethylene groups (Ethomeens\*\*), as emulsifying agents for the preparation of cationic emulsions.

Armour's brochure states that: "The deposition of the asphalt globules onto a surface from a cationic emulsion takes place in startling contrast to the anionic variety. The 'break' of a cationic emulsion is primarily a chemical phenomenon which, due to the natural attraction or substantivity of the cationic agent, begins to take place at the moment of contact.

"Surface and atmospheric conditions have little effect, if any, on the adherent properties of the cationically treated asphalt and the presence of moisture on a surface is no deterrent to adhesion. The strong preferential attraction of the cationic agent actually displaces water from the surface thereby creating a common chemical bond between it and the asphalt. The bond is such that an antistripping effect is obtained."

Stability: In any discussion of the stability of an asphalt emulsion, it must be made clear just what circumstances are considered. Are we referring to breaking of the emulsion because of (a) loss of water, (b) chemical reaction, (c) agitation, (d) heating or (e) freezing? Are we concerned with stability in storage, during transport or on stone or other solid surface?

The stability of an asphalt emulsion (resistance to coagulation of the droplets of asphalt) is dependent on a number of factors. Each of these many assume a greater or lesser importance depending on the kind of emulsion. In the following list the factors influencing stability are not given in order of importance.

1. Concentration of the asphalt phase (viscosity of the emulsion).
2. Size of the asphalt droplets.
3. Particle size distribution.
4. pH value of the aqueous phase.

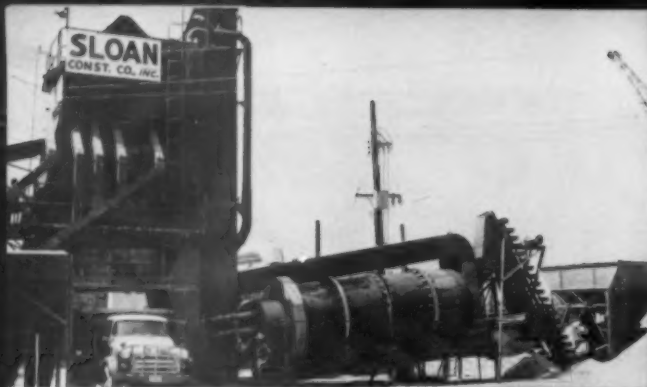
5. Surface tension between the

*Continued on page 164*

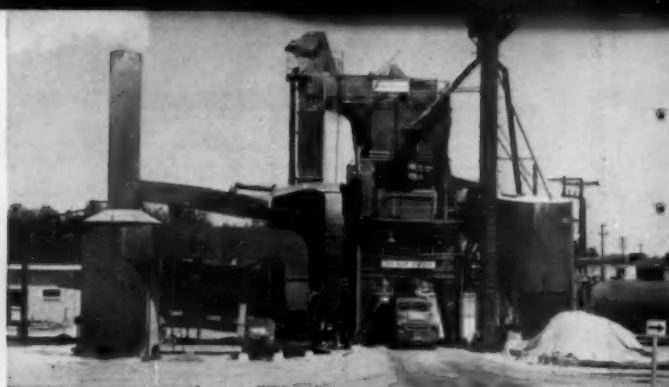
\* Trade-mark of Armour Industrial Chemical Company.

### Effect of Particle Size Distribution on Viscosity of Emulsions

Percent of Emulsion A	Percent of Emulsion B	Viscosity at 25° C. in Saybolt-Furol Sec.
0	100	36.0
10	90	23.0
20	80	21.5
30	70	20.0
40	60	19.5
50	50	20.5
60	40	21.5
70	30	24.5
80	20	26.0
90	10	33.0
100	0	41.5



Oldest of the Sloan BatchOmatics is this 894, Liberty, S. C., which runs 100% automatic and has produced 515,000 tons since 1956.



On a permanent location at Lakeside Quarry, Greenville, S. C., this 896 BatchOmatic is nearing the 200,000 ton mark and has run 100% automatic since the fall of 1958.



Here's an 848 plant that has been moved 30 times since 1952 and has produced 1,600,000 tons over that span. Located at Blacksburg, S. C., the plant averages 150 tph with a top of 225 tph.



Third and newest of the Sloan BatchOmatics is this Model 896 shown just starting operations at Pacolet, S. C.

## FIVE BARBER-GREENE PLANTS OF LOW-COST MIX FOR

**Large asphalt contractor in southeast buys 6th plant to work with  
nine Barber-Greene finishers on '60 contracts totalling 1,200,000 tons**

Sloan Construction Co., Inc., Greenville, South Carolina, large asphalt contractor in the southeast, has produced 5,090,800 tons of low-cost asphalt mix with five Barber-Greene Continuous Mix and BatchOmatic plants.

V. H. Breazeale, vice president and procurement manager, says "We have just added a sixth Barber-Greene—a Model 896 BatchOmatic, to use with our nine Barber-Greene finishers in handling our 1960 contracts which total 1,200,000 tons, including \$4,500,000 worth of Interstate jobs.

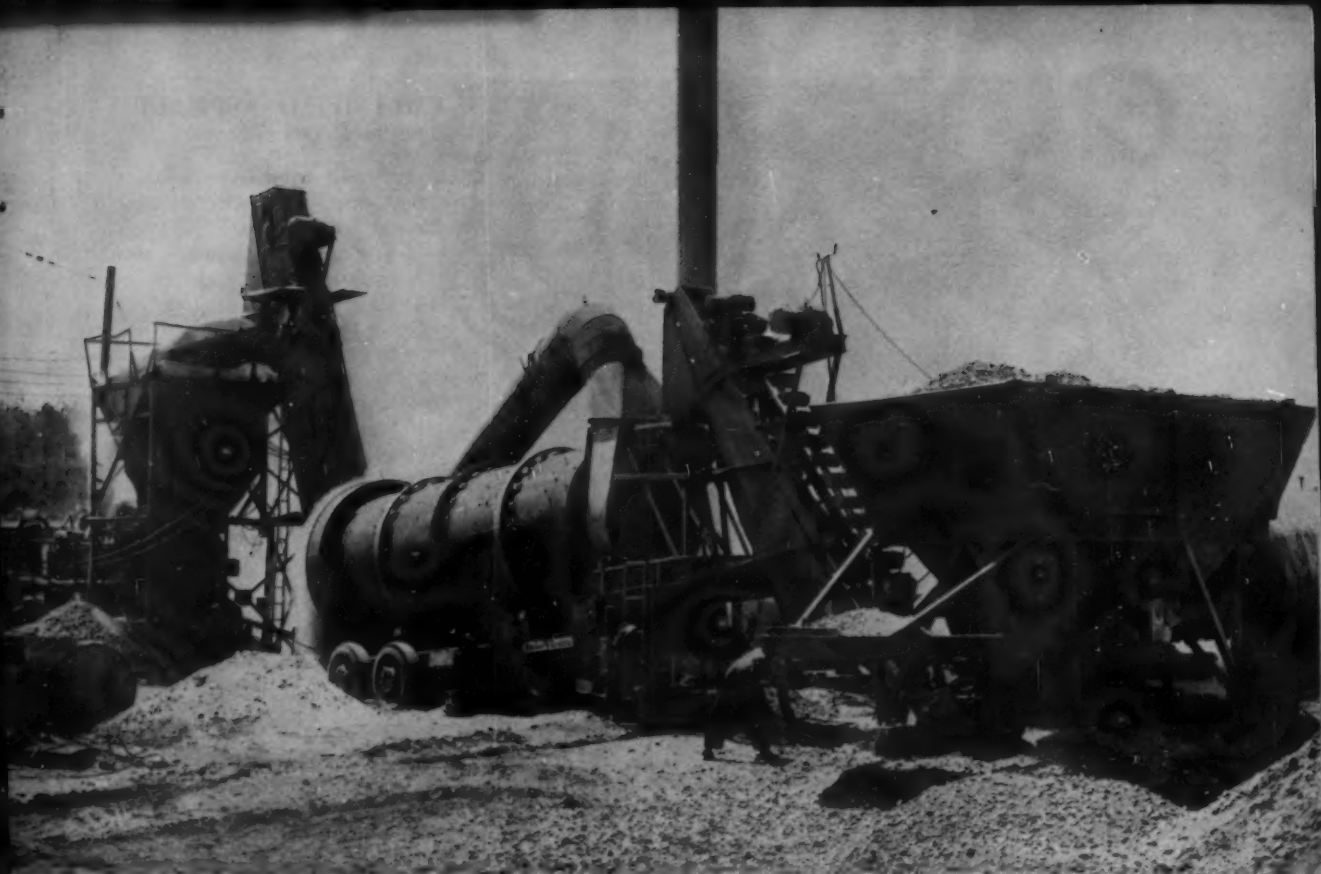
**All Plants Are Barber-Greene**—"We've standardized on Barber-Greene plants," he adds, "because of years of satisfactory service from the equipment and the men who back up what they sell. We buy Continuous Mix plants because we've found they consistently maintain accuracy well

within spec tolerances and because of the ease with which they can be transported from job to job and set up in 3-5 days. Because of this good record, we have now decided upon Barber-Greene BatchOmatic plants for our permanent installations. Maintenance on all our plants has been low and our men are so familiar with them that servicing is done in minimum time."

Sloan's present plants, purchase dates and total output follow: Model 848 Continuous Mix, 1946, 2,200,000 tons; Model 848 Continuous Mix, 1952, 1,600,000 tons; Model 848 Continuous Mix, 1955, 600,000 tons; Model 894 BatchOmatic, 1956, 515,000 tons; Model 896 BatchOmatic, 1958, 175,800 tons; and Model 896 BatchOmatic, 1960, ready to start operations.

Before buying your new asphalt plant, check





Starting its 15th year of service is this Model 848 Continuous Mix plant, the oldest of the Sloan-owned Barber-Greene shown at Fair Forest, S. C. The firm has produced 2,200,000 tons of mix

with this durable veteran that shows no signs of approaching retirement age as it heads for the 3,000,000 ton class.

# PRODUCE 5,090,800 TONS SLOAN CONSTRUCTION CO., INC.

with your Barber-Greene Distributor and discover why his plants were again an overwhelming No. 1 choice of contractors in a 1960 poll. He offers you

greatest choice of components, greatest values, even complete materials handling systems including conveyors, elevators and feeders.



Only Barber-Greene offers four different finishers plus a new versatile Road Widener—equipment sized for all your needs.

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Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia



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## Keeping asphalt flowing from barge to truck

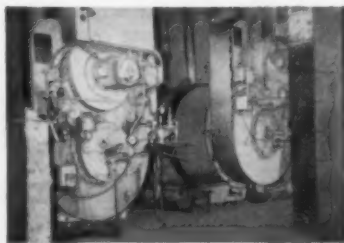
Kentucky Asphalt Sales Company — owner of South's largest marine terminals — expands with Cleaver-Brooks Peak-Temp oil heaters and packaged boilers — dependable heat for coordinated plant operation

Heat is basic to Kentucky Asphalt Sales Company's system of barge-to-truck asphalt handling. That's why Cleaver-Brooks equipment was again the choice for heat at their huge, new Kentuckiana (Louisville) terminal. Cleaver-Brooks heaters proved outstanding in heating over 19,000,000 gallons at Margene Terminal, Eddyville, Kentucky.

Asphalt is brought in from the refinery on barges. Dockside, it is heated and transferred via elevated, steam-jacketed pipes to storage tanks. From transfer tanks, asphalt is pumped into tank trucks which deliver asphalt, hot, to jobs within a 300-mile radius of Louisville. All the way—winter and summer—Cleaver-Brooks Peak-Temp heaters and boilers keep asphalt hot and on the move.

Peak-Temp oil heaters are forced-

circulation type, fully automatic. They heat up to 450 F at low, safe pressure. Heat transfer oils they use will not freeze nor do they create pressure problems. For full information on this versatile heater and CB packaged boilers, write Cleaver-Brooks Company, Dept. G, 395 East Keefe Avenue, Milwaukee 12, Wis.



**TWO PEAK-TEMP OIL HEATERS** maintain pumpable temperature of 175 F in large storage tanks. Asphalt is heated to temperature as high as 325 F within transfer tanks.

**Cleaver-Brooks**  
ORIGINATOR AND LARGEST PRODUCER  
OF PACKAGED BOILERS

### EMULSIFIED ASPHALT

*Continued from page 161*

asphalt and aqueous solution.

6. Nature and concentration of the stabilizing agent.

7. Freezing of the aqueous phase.

8. Heating to temperatures above 150° F.

9. Contact with electrolytes or any substance which will change the pH value (mainly for anionic emulsions).

10. Mechanical agitation of the finished emulsion, especially if air is entrained during the mixing.

11. Sedimentation or creaming of asphalt particles.

12. Putrefaction of protein stabilizer.

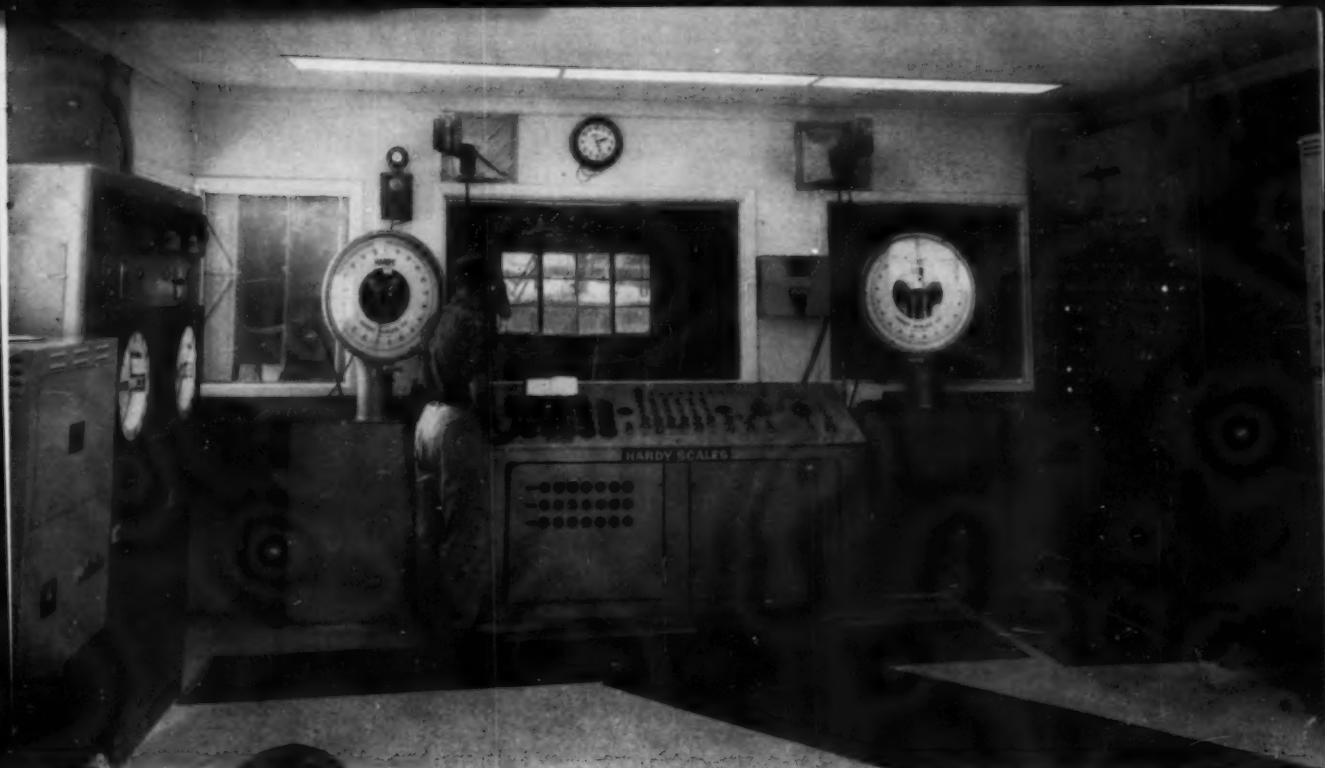
**Flow Properties:** The consistency of asphalt emulsions is governed principally by (a) asphalt content, (b) asphalt particle size and size distribution and (c) nature of the lyosphere surrounding the asphalt droplet. Viscosity of an emulsion decreases with dilution or decrease in asphalt content. Herein lies one of the values of asphalt emulsion in commercial use. A high viscosity emulsion can be quickly, easily and economically reduced to a lower and more workable consistency by the addition of water. The dilution of the emulsion can be controlled to leave a film of the desired thickness on the stone or other solid surface.

In most cases, the particle size and size distribution can be regulated by the processing procedure used. Formulation of the aqueous phase governs the thickness and nature of the lyosphere around the droplets.

**Effect of Droplet Size and Size Distribution On Consistency:** Flow properties of emulsified asphalt are profoundly influenced by the size and size distribution of the asphalt droplets. This is illustrated by the data here tabulated. Emulsions A and B were made to have particles of uniform but respectively different sizes. When they were blended the resulting emulsions were all less viscous than the original because of the increase in particle size distribution. If all other variables are held constant an emulsion possessing small particles will have a higher viscosity than one possessing large particles.

*Continued on page 171*

... for more details circle 294 on enclosed return postal card



Central control room of the new integrated automatic asphalt plant of Sicilian Asphalt Paving Company. The panel at left is a 110-volt Wheelco unit that automates operation of oil burners for the dryers. Console in center electronically proportions mixtures of asphalt, sand and stone to preset accumulative weights, and batches out exact tonnage required per truckload. Right panel contains motor starters for all pumps, conveyor belts, elevators and fans used in the automatic plant.

## Electric Heating Feature of 'Most Automatic' Asphalt Plant

A hot mix plant which integrates fully-automatic central control, electric heating and modern transfer methods has begun operation in Brooklyn, New York. Owned by Sicilian Asphalt Paving Company, the 2,000-ton-per-day plant is designed for labor-saving efficiency and control over product characteristics.

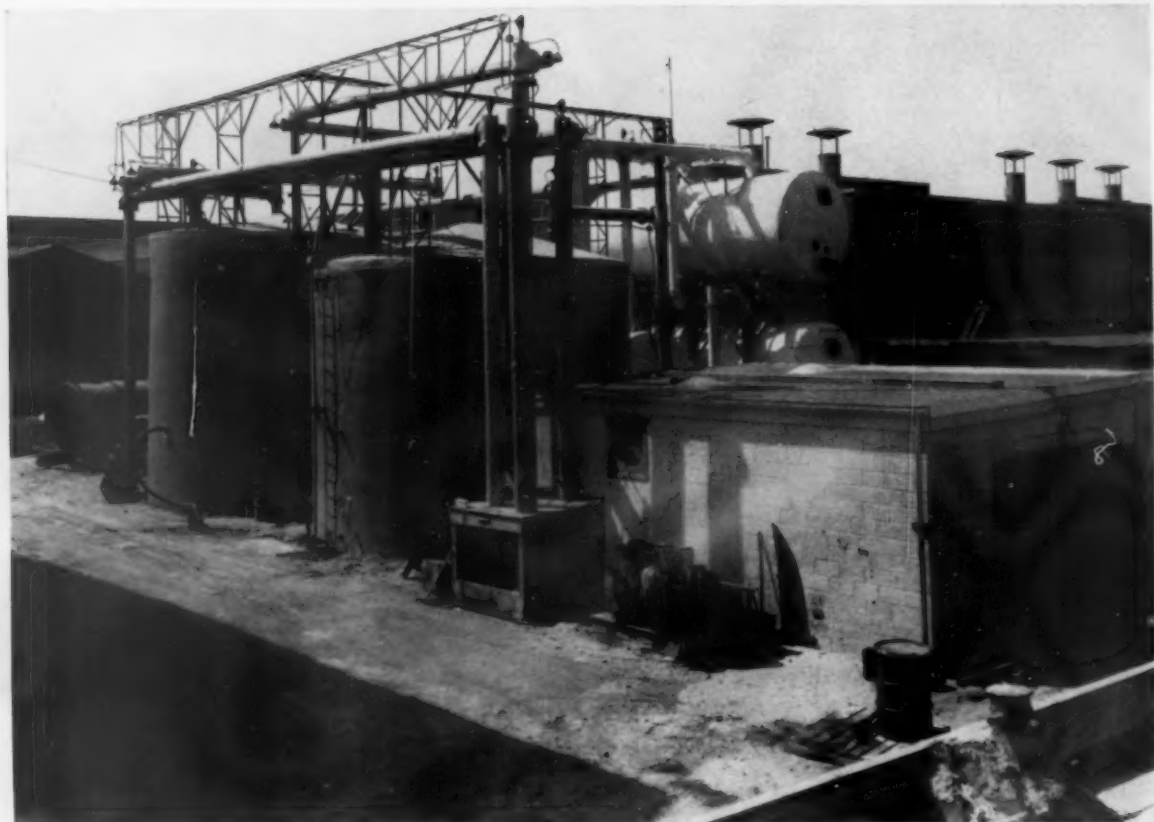
The control room operator selects the type of materials to be blended and initiates the operating sequence that, ten minutes later, loads the waiting trucks with the exact tonnage requested.

The asphalt is kept at controlled temperatures in all asphalt feed lines, pumps and tanks by Hynes electric resistance heaters. A manually-preset thermostat controls temperatures in the tanks and internally traced pipe lines. A time-clock control cuts off the 442 kw of heater load from the main line at demand hours.

Four grades of asphalt are stored in seven tanks ranging from 8,000 to 45,000 gal. capacity. Separate lines, pumps and valves direct the flow of the four asphalts which are 67-70 and 85-100 penetration, MC2

and an MC2 blend. Pumps, valves and strainers for each of the four separate asphalt lines are externally traced with Hynes electric resistance heating units which extend 73 ft.

All motor starters for pumps, conveyor belts, elevators, fans and related units, are centralized in a single panel in the control room. These motors develop 680 hp at startup. At startup the control room operator first sets in motion the screens in the mixing tower. These screens segregate sand, 1/4-in., 3/8-in. and 3/4-in. stone into separate bins above the mixer. An air-operated



Showing asphalt tanks and pump room. Feed lines, tanks and pumps are heated by elements drawing a total of 442 kw in electric power.

selector switch opens and closes gates to transfer material from the hot elevator to one or more screens. Two screens are usually needed to handle the 150-ton maximum output from the dryer.

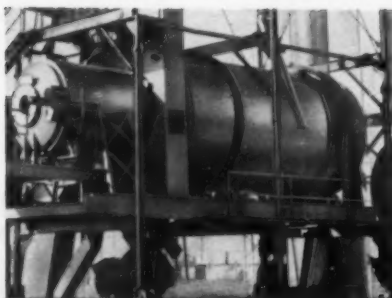
With the screens in action the control room operator starts motors for the subsequent operations in the following sequence: (1) hot elevator, (2) fuel oil pumps for two dryer burners, (3) dryer rotating motors, (4) inlet and outlet burner fans. Pressing an ignition starter then lights a pilot to ignite the burner fuel. The pilot flame triggers a photoelectric cell that opens a solenoid valve to permit flow to the burners. This action also automatically starts fans for the washer which boost the induced draft system and reduce load on the burner fans. The burner flame is used to signal an allen-bradley control unit which automatically starts the cold elevator and cold feed belts.

*Continued on page 168*



Trucks receive electronically proportioned asphalt mixture batched out in exact-weight truckload.





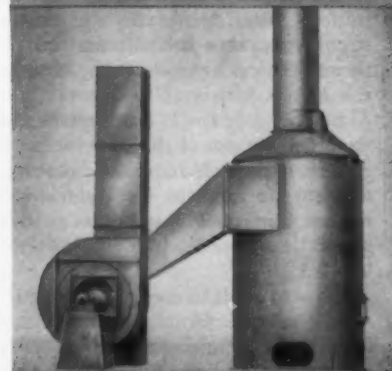
**SIMPLICITY DOUBLE SHELL DRYER**  
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itself in fuel savings alone.



**SIMPLICITY FEEDER BIN**  
accurately feeds coarse  
and fine aggregates.



**SIMPLICITY PUG MILL MIXER**  
with ample cubic capacity below  
center line of shafts.



**SIMPLICITY AIR WASHER**  
inexpensive but efficient.  
Stops smoke and dust.

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and for making it run better  
than ever before."



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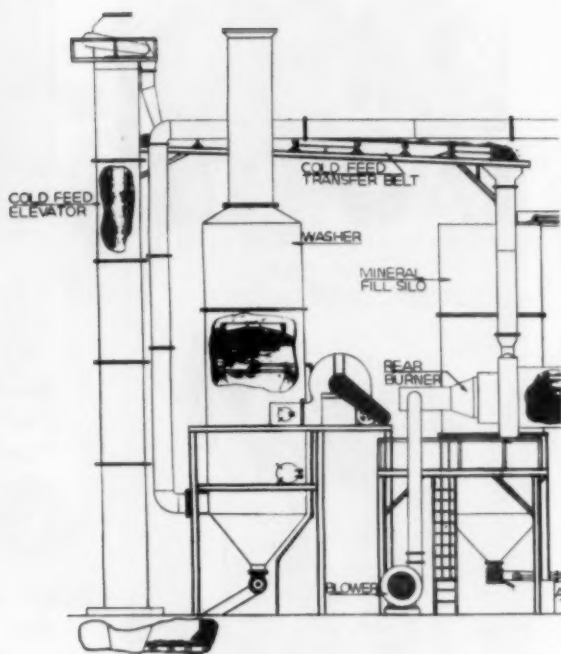
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These interlocked pumps feed four grades of asphalt from storage tanks to mixing tower. Pumps and air-operated 3-way valves are externally traced with resistance heating elements to maintain accurate flow temperatures.



## ELECTRIC HEATING

*Continued from page 166*

Two continuous feed belts—for stone and for sand—convey cold materials from storage piles through underground tunnels. The control operator selects the type of material needed, automatically opening a gate at the proper storage pile and starting the belt on which it is carried to a central mixing hopper. From the hopper another transfer belt carries the material out of the tunnel to the boot of the cold elevator.

The final mixing of asphalt is done automatically by a Hardy Scale batching unit. This unit proportions materials electronically to preset accumulative weights, and also batches out the exact tonnage required per truck load. Asphalt is fed to the mixer at 70 psi nozzle pressure by positive displacement pumps powered by 10 hp, 1750 rpm, 3-phase electric motors. As part of the feed refinements, more than 1,600 ft. of asphalt pipeline is in-

ternally traced with Hynes electric heating elements drawing 163 kw. Traced lines are thermostatically controlled to an accuracy of  $\pm 5^\circ \text{F}$  (a  $25^\circ \text{F}$  spread is maintained in the seven asphalt tanks). The internal heating elements deliver all heat directly to the asphalt without waste. The low watt density of the elements plus thermostat control prevent coking due to hot spots or high surface temperatures. The heating elements are easy to remove through the terminal boxes without disrupting the system.

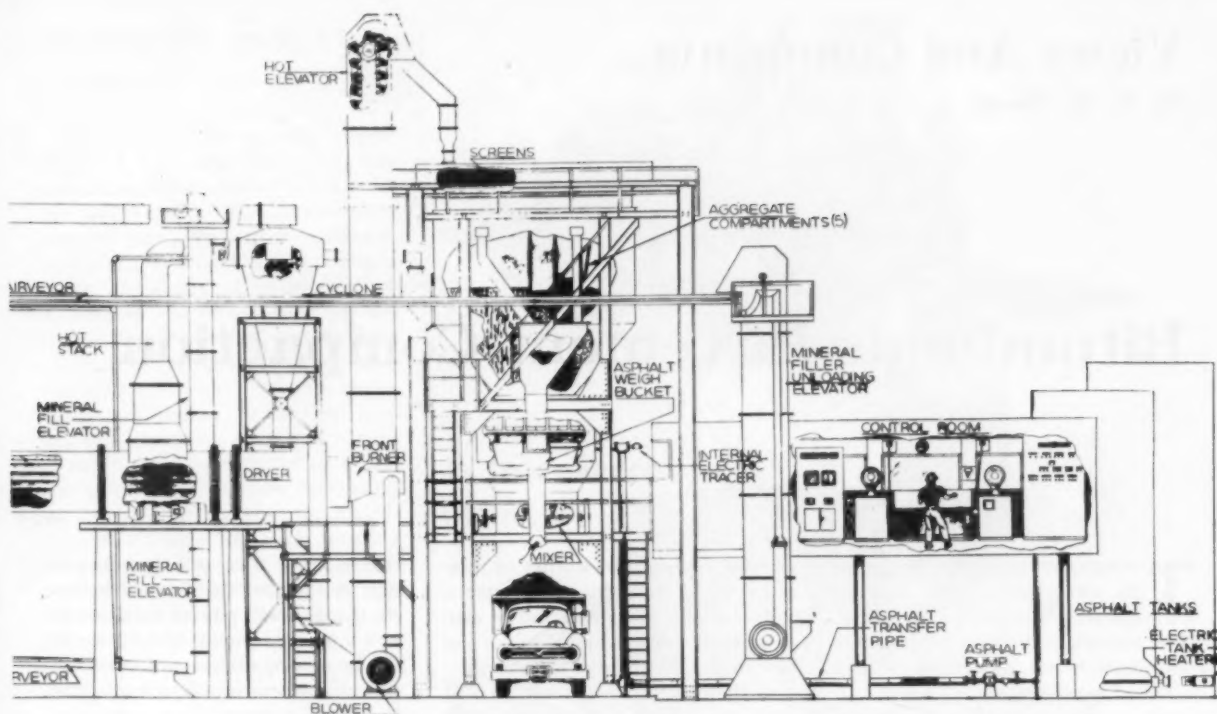
External heating of the 6-in. 3-way valves on the pump lines utilized metal sheathed type heaters. These valves, on lines for each of the four grades of asphalt, are air-operated. The four separate pumps are interlocked with the scale system.

A washer removes fine dust particles from the hot air of the dryer after the heavier particles have been collected in a cyclone. Sludge from the water scrubber goes directly to

a settling-out pit, where fine particles are removed by endless chain flights and the clear water recycled to the washer.

Mineral filler (200 screen), used as required in the asphalt mix, is trucked in from the local power station, and unloaded into a dust elevator, lifted 30 ft., and transferred horizontally to a dust silo. A mineral filler blister on the mixing tower is kept full automatically by mechanical bin indicators. When the blister bin is at low level the indicator starts (1) an airveyor from the bottom of the mineral filler bin, (2) a 34-ft. dust elevator and (3) an airveyor from elevator to dust blister. The system is automatically stopped when the blister is filled.

Induced draft burners for the two dryers remove moisture from the stone in the incoming cold feed, and maintain the proper temperature of the aggregate for the hot feed into the mixer. Aggregate temperature is set at the control room panel



Elements of the Sicilian's new automatic plant. The asphalt storage tanks and feed lines (right) are kept at controlled temperatures with Hynes electric resistance heating elements.

and automatically controlled at the set point. The mixing tower has a 250-ton capacity for hot materials.

Since Sicilian's plant is located on a small waterway, sand and stone are barged in. These materials are transported to storage piles on an endless belt with an automatic tripper to insure even distribution for each storage pile. Underneath each pile is the cold-feed conveyor tunnel with 13 air-operated gates set approximately 10 ft. apart in line above the sand and gravel feed belts.

A complete intercom system connects all major points of the conveyor tunnel, truck station control room and pump room with the main dispatch office.

The design and construction of the plant was by McCarter Iron Works, Norristown, Pa. The complete overall design was under the supervision of William Helbock, chief engineer, Sicilian Asphalt Paving Co.

## Virginia Asphalt Association Elects



Photographed at the Virginia Asphalt Association, Inc., annual meeting, held recently at Richmond: president-elect William H. Ford, of J. R. Ford Company, Inc., Lynchburg; Virginia's new commissioner of highways, H. H. Harris; association retiring president T. R. Giblin; and association executive director R. E. Williams, Jr. Not pictured are v-p-elect Edmund Pendleton, Pendleton Construction Corp., Wytheville; and secretary-treasurer Gordon F. Penick, Asphalt Paving Service, Richmond. Guest speaker at banquet was Dr. Jesse E. Buchanan, president of The Asphalt Institute.

# Views And Comments

By H. G. Nevitt

## Bituminous Pavement Compaction

**T**echnology generally advances in two ways. The first is through new discoveries or ideas. The second is through more exact information on situations which have already been recognized, at least in a general way, such further data making possible or indicating the desirability of action not previously appearing needed or warranted.

Two instances of the latter type of developments should together lead to an early modification of present practice, and will therefore be discussed here.

It has long been observed that pavements usually consolidate under traffic to a considerable degree beyond the compaction achieved during construction; modern load intensities and frequencies are accelerating this process. Some engineers have thought that this densification would only continue for a limited time, until a state of equilibrium was reached. Others have believed that it would normally continue indefinitely, or until stopped by the lack of further room to compact due to the binder filling up all the available voids, this latter condition of flushing being accompanied by loss of stability, pavement rutting or shoving, and allied phenomena.

Recent developments have shown that this last situation is the usual one, and emphasize the point, previously made by us and others, that recognition thereof must appear in pavement design. This statement is confirmed by the work done on heavy pavement design and pro-

gressive compaction studies of mixes by the U. S. Corps of Engineers.

Essentially we must today estimate the probable useful life of the pavement, the degree of consolidation that will have occurred in this time, and have assured ourselves that during it the pavement voids will not have yet reached the flushing condition. This of course recognizes that compaction takes place during the life of the pavement, and that the void volume at the start of this period will exceed the voids existing at its end.

As compaction progresses the void decrease is at a slower rate. A considerable increase in construction compaction will bring the voids down to a figure much nearer the final permissible level, without appreciably affecting the time under traffic required to reach the danger point. Hence design based on such greater construction compaction and low initial voids will not be materially different from that for initial void volumes about as we see them today.

This situation has considerable bearing on another matter. We have long recognized that the rate of pavement hardening depended on the void content; and particularly that high void pavements hardened with great rapidity. Considerable data have appeared in the last few years to confirm this logical conclusion and show the quantitative relationship between voids and hardening. It is such that a great decrease in the hardening rate will accompany a relatively small initial increment in the applied compac-

tion energy. The practical conclusion is that increased construction compaction will pay off handsomely in a longer pavement life, where all the factors of design and construction are otherwise taken care of in normal fashion.

Such additional compaction can be obtained by today's procedures applied in greater quantity. However we predict that changes in construction techniques (and perhaps in equipment to make this possible) will shortly appear so that these higher densities can be obtained at little increase in cost. Rolling will start earlier, to take advantage of the greatly reduced resistance to compaction shown by the hotter mix. More rollers will be used to intensify the speed of compaction during this warm period, and these rollers (pneumatic or vibrating, or both) will provide a greater compaction effort. The net result will be to bring the pavement to a much higher initial density, meaning much less change during its period of use, with benefits in increased initial strength in not merely the surface course but also in the entire structure, as well as a much slower rate of hardening.

We believe that many developments such as this, offering considerable advantages at little additional cost, will appear as our knowledge of pavement technology becomes more precise. This will be simply another example of the basic fact that economy in road construction requires more and better engineering. When this is provided it pays off.



## EMULSIFIED ASPHALT

Continued from page 164

**Rheological Characteristics:** The kinds of flow exhibited by asphalt emulsions were studied by Lyttleton and Traxler (3). An investigation of more than thirty different emulsions showed that they fell into three rheological categories. A Brookfield viscometer used for determining the effect of varying rates of shear revealed three representative types of flow. Asphalt emulsions manifesting Newtonian flow are not common. A plastic nature is exhibited by most asphalt emulsions, with the viscosity decreasing as the rate of shear is increased. The third type of flow involves behavior similar to the phenomenon of "inverted plasticity" or rheopexy. It is believed that the limiting case of this type of flow is the appearance of dilatancy which has been observed occasionally with very heavy emulsions. Lyttleton and Traxler found only small variations of viscosity with temperature over the range 65 to 95° F.

### Literature References

1. Mertens, E. W. and J. R. Wright, Highway Research Board Proc. 38 386 (1959).
2. Armour Chemical Division "Laboratory Progress Report on Cationic Emulsions" Chicago, Illinois December 20, 1958.
3. Lyttleton, D. V. and R. N. Traxler, Ind. Eng. Chem. 44 1656 (1952).

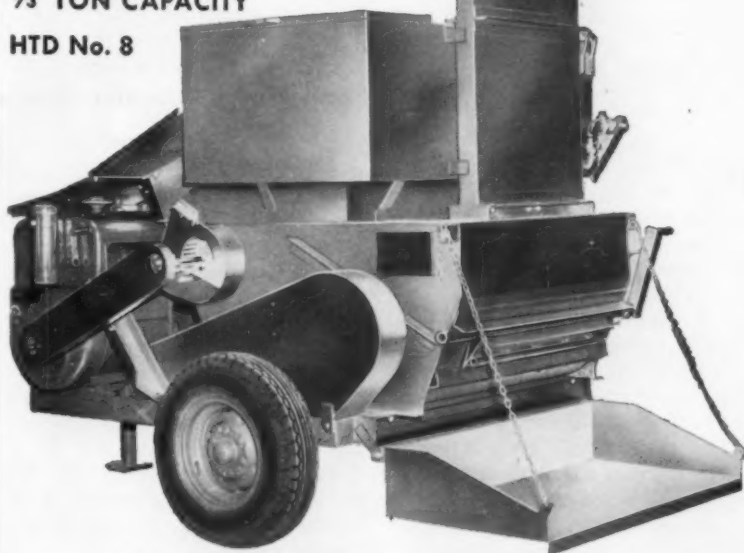
## Asphalt Institute's 5th Annual Seminar

The Asphalt Institute's annual "Asphalt Paving Technology and Construction" seminar for college engineering instructors will be held this summer at the University of Minnesota. The six-weeks graduate program in asphalt paving technology and construction begins July 25 and concludes September 1.

This seminar will mark the fifth consecutive year that The Asphalt Institute has cooperated with leading universities in presenting the course. The Minnesota program will be under the direction of Professor Miles S. Kersten of the University's Department of Civil Engineering.



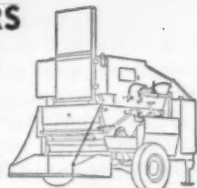
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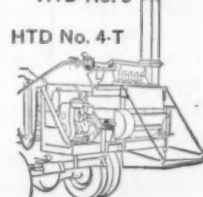
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# Western Refiners Told of Asphalt Paving Problems and Trends

By H. G. Nevitt  
Special to Roads and Streets

**P**POINTS of wide interest to highway engineers came out at the Asphalt Symposium held during the 48th annual meeting of the Western Petroleum Refiners Association. This meeting, at San Antonio, Texas, March 28-30, was under the chairmanship of John S. Pfarr.

Dr. J. E. Buchanan, President of the Asphalt Institute, in his paper "Asphalt in the Highway Program," first pointed out the great interest highway construction should have for the oil industry, since roads are an essential factor in the consumption of petroleum products. He outlined some of the promotional problems involved in obtaining full utilization of asphalt in competition with other pavement types.

The Institute's president stressed his organization's policy of urging type selection on basis of minimum cost between equivalent designs. He also dwelt on the benefits to be derived from stage construction, in both depth and width of roadway. Stage development offers advantages for even the heaviest duty highways from the engineering standpoint. This approach often can benefit the public by making possible a larger mileage of usable roads at an earlier date.

Commissioner Ellis L. Armstrong of the U. S. Bureau of Public Roads talked to the refiners on "Research for Quality Asphalts." He prefaced his discussion by pointing out that the automotive and petroleum

groups and the highway agencies were merely segments of the transportation industry. This broad industry has been the principal factor in building the America of today, and it faces the responsibility of increasing the benefits it had provided.

Cooperation between all the transportation industry segments is essential to maximum progress, the Commissioner reminded.

Bearing more directly on this audience's immediate interest, Armstrong outlined the findings of the Bureau's study of asphalts in actual use (initiated in 1954). This study shows that materials meeting specifications in common use might vary widely in other properties of evident importance from the utilization standpoint. This study's conclusion was that more knowledge of asphalt is essential. The need, continued the Commissioner, is for studies which combine field observations with laboratory examination over a wide area of the country, as well as for more information and truly quality tests. He mentioned the development of the BPR thinfilm oven test and the Shell Aging Index, both offering information on hardening tendencies, as efforts in this latter field. He then outlined some factors on which more knowledge was needed.

Following these points Commissioner Armstrong stressed the great need for more precise knowledge of pavement design; and finally the

result of satisfying the above needs, which would be superior quality materials and specifications. His conclusion was that these demands could only be met by close cooperation between all the parties concerned.

Another paper, by V. R. Smith, entitled, "Important Trends in Asphalt Paving Specifications," fitted well with Commissioner Armstrong's review of the basic situation. He noted that asphalt specifications in the beginning merely restricted the material to the properties shown by the early asphalts that had appeared suitable in service. These early specifications did not attempt to define products which best met the functional needs.

Smith listed the desired performance properties of asphalt, and the physical and chemical properties which in his view would provide them. A detailed discussion followed on the properties of consistency, polar character, rheological character, chemical reactivity, volatility and freedom from contamination. He then presented a tabulation which summarized his estimate of the trends towards more meaningful and precise, as well as scientific, tests and specifications, covering development expected in the near future as well as probable later developments.

Generally speaking, future as-  
*Continued on page 174*

# 240 TONS PER HOUR!

# 243,000 TONS IN 9 MONTHS!

## 6 "SET-UPS"

5 State jobs and 1 City job required 6 different plant "set-ups."  
Distances between "set-ups" varied from 8 miles to 540 miles.

... reports Mark C. Whiting, President of  
Whiting Bros. Const. Co., Inc., Las Vegas, Nevada

**DISMANTLED, MOVED  
AND SET-UP IN ONE DAY**  
Plant was dismantled on Saturday  
... moved 8 miles and was in full  
production again Monday morning.  
(Only work done on Sunday was  
connecting asphalt lines and chang-  
ing screens.)



the Contractor ...  
**WHITING BROS.  
CONST. CO., INC.**  
the Asphalt Plant ...  
**MADSEN**  
**MODEL 481 5000-LB. PLANT**



*Equipment that Serves.*

MADSEN maintains a complete parts stock in Los Angeles and Lima, Ohio

Figures like these tell a story.

They indicate the tremendous output of the MADSEN Model 481 5000-lb. Asphalt Plant over a period of months on various Federal and State Specification mixes ... the kind of day-in and day-out tonnage that builds owner profits. They tell of the easy, low-cost maintenance and economical operation of the MADSEN Model 481. (Downtime in the 9 months period was only 12 hours.) They show how the unit construction of the MADSEN Model 481 pays off in ease of portability and fast, easy set up and dismantling. And most important, they show that the MADSEN Model 481 Asphalt Plant gives you the advantages you need to make greater profits in today's fast-moving asphalt mixing business. Check with your MADSEN Distributor today.

1910 - 1960 **50** YEARS - SERVING INDUSTRY

**MADSEN WORKS**

Construction Equipment Division  
BALDWIN-LIMA-HAMILTON CORPORATION  
P.O. BOX 38, La Mirada, California



BALDWIN-LIMA-HAMILTON CORPORATION P.O. Box 1, Lima, Ohio

**MADSEN PRODUCTS**

ASPHALT PLANTS • PUG MILL MIXERS • AGGREGATE DRYERS • DUST COLLECTORS • ROAD PUG TRAVEL MIX PLANTS • WEIGH BATCHERS • DUST WASHERS • FEED BUNKERS  
FEED TUNNELS • ASPHALT TANKS • ASPHALT & FUEL PUMP UNITS • CONCRETE FLOAT FINISHERS FOR AIRPORTS AND HIGHWAYS • HIGHWAY-AIRPORT BASE STABILIZER PLANTS

... for more details circle 339 on enclosed return postal card

**ROADS AND STREETS, June, 1960**

**173**

# Grace ASPHALT AND COMPACTION EQUIPMENT



Roadsweepers,



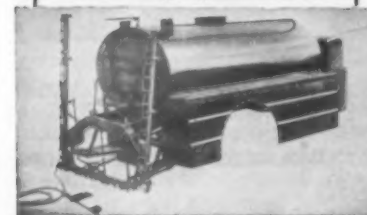
Sheepfoot rollers



Chip spreaders



Circulating asphalt heaters



Asphalt Distributors



Pneumatic rollers, self-propelled or trailed

**W. E. GRACE MFG. CO.**

6007 S. Lamar Street  
Dallas, Texas

## NEVITT

*Continued from page 172*

phalt specifications will vary considerably from those presently used if Mr. Smith's predictions prove to be correct.

In addition to these discussions bearing primarily on asphalt, the program included a paper by Prof. W. S. Housel on "Service Behaviors as a Design Criterion for Pavement Design." This presented an analysis of the considerable data from pavement profile surveys obtained by the Michigan state highway department in the last two years, covering all varieties of pavement. The graphs presented indicate that pavements tend to increase in roughness with time, and deviations from the normal or average rate of increase may be very illuminating in bringing out the probable factors behind such deviation. Examples of the same pavement with different rates of change were correlated with the probable causative condition.

Prof. Housel pointed out that both initial low roughness and elimination of factors which accelerate the rate of roughness increase would be essential to long life, if a limiting roughness rating were to be adopted (along with durability requirements) as a criterion of useful life. This speaker gave examples of a low roughness rating, showing the smoothness possible when the contractor makes an intensive effort.

The essence of this paper is best brought out by a quotation from Prof. Housel's tentative conclusion: "This brings realization that pavement performance cannot be measured in terms of static equilibrium of a beam resting on an elastic foundation subjected to static loads, with strength controlled by a direct proportionality between load, deflection, and stress.

"On the contrary, an objective viewpoint sees the pavement slab expanding and contracting with changes in temperature; curling and warping with temperative differentials between top and bottom; growing and shrinking with moisture changes; and distorted by frost displacement, only partially relieved by thawing of the frozen substructure.

"All of these effects, superimposed on stresses due to load, make the life of a pavement an ever-changing cycle of dynamic effect which seems to require a new and more realistic concept of pavement performance."

These words may carry disappointment to those attempting to apply design methods assuming an elastic condition to flexible pavements. Yet the words encourage the proponents of this type due to its obvious superior reaction to some of the factors presumably leading to deterioration listed by Prof. Housel.

The concluding remarks of the chairman, and the tenor of comment by those attending the San Antonio symposium, indicated that petroleum industry leaders are more fully realizing the complexities of highway design and construction. And these leaders realize the real job ahead if the appreciable improvements in pavement design apparently possible are to be achieved.

## Ward Heads Asphalt Paving Technologists

James E. Ward, Barber-Greene Company, Aurora, Ill., was elected president of the Association of Asphalt Paving Technologists at its winter meeting. Other 1960 officers elected at that time are as follows:

First vice-president: James M. Rice, National Rubber Bureau, Washington, D.C.

Second vice-president: Frank M. Williams, Ohio Department of Highways, Columbus.



James E. Ward

... for more details circle 316 on enclosed return postal card





# **2 NEW TRAXCAVATORS**

## **BY CATERPILLAR**

**WITH POWER SHIFT TRANSMISSION**

**AND LIVE ACTION HYDRAULICS**

**977 Series H • 955 Series H**

*...all new for new high production*

# FASTER loads...lifts...hauls...



.00 sec.

**READY TO GO.** With the range selector in low, the operator has only to use the power shift lever for split-second changes of speed and direction. Between the range selector and the power shift lever, the new 977H has 4 speeds forward and 4 faster in reverse. However, for the average job, only the power shift becomes the operating lever. Automatic tilt control has positioned the 2½ cu. yd. bucket for digging.



4.2 sec.

**FASTER LOADING.** With 150 HP at the flywheel and an operating weight of 36,270 lb., the 977H develops up to 72,000 lb. push at converter stall without stalling the engine—push aplenty to break out big loads. Live Action Hydraulics deliver increased digging power to operate the bucket with greater speed and force for faster loads. The material here is an earth and gravel mixture, up to one inch in size.

## New Cat Series H Traxcavators!

There is a way to beat higher costs—and that's with increased production. For tractor-loader jobs, here's your answer in the new Caterpillar 977H and 955H Traxcavators. Designed to set a production pace far faster than the models they replace and any other tractor-loaders of comparable size, they're milestones in tractor-loader progress. With Cat power shift transmission and Live Action Hydraulics, they're machines that never stop. Look at the action pictures here and you'll see why. That's the 150 HP 977H with its 2½ cu. yd. bucket working. The 100 HP 955H with its 1¾ cu. yd. bucket is equally spectacular. Listed here are some of the features that make these machines the fastest working tractor-loaders ever built. For complete details, see your Caterpillar Dealer.



13.2 sec.

**FASTER HAULING.** Using a light touch on the power shift lever to reverse instantly and pick up haul speeds, the operator returns at 4.0 average MPH over a total distance of 48 feet to the truck. Because the new 977H is heavier than the previous model and its center of gravity is 10% further to the rear, it has greater stability to handle with ease the heavier loads in the new 2½ cu. yd. bucket.

# dumps...cycles!



18.0 sec.

**FASTER DUMPING.** The 977's bucket reach of 39½" at 9' 4" dump height easily clears this 7' 8" high, 10 cu. yd. truck. With this reach, the operator can cast the load where he wants it without time-wasting jockeying. Automatic kick out on the lift controls further reduces bucket maneuvering time. Dumping completed, the operator moves the power shift lever for instant return toward another load.



26.4 sec.

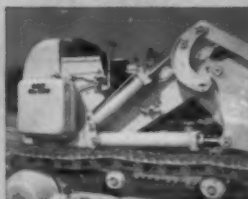
**FASTER RETURN.** With a return time of 8.4 sec., the total cycle time for the 977 was 26.4 sec. In a typical job study, the average cycle time per truck load was 117.6 sec. In 60 minutes the 977H loaded 30.6 trucks with a total of 306 cu. yd. This is typical of the outstanding performance you can expect from the 977H—and, in its capacity, from the 955H. Nothing in their size range can match the Traxcavators that never stop for fast cycles and high production!

## NEW POWER SHIFT TRANSMISSION



One lever—that's right, one lever gives split-second changes in speed or direction to slash cycle times and increase operator efficiency. This Caterpillar exclusive was designed especially for the 977H and the 955H.

## NEW LIVE ACTION HYDRAULICS



Another Caterpillar first. Live Action Hydraulics provide faster lifting speed and greater lifting capacity without robbing power from the tracks. The 977H packs 41% more hydraulic lifting power—955H, 23% more than former models.

## MORE HORSEPOWER WITH NEW CAT TURBOCHARGED ENGINES

Up 50% on the 977H—its new Cat D333 Engine develops 150 HP at the flywheel. Up 43% on the 955H with a new Cat D330 Engine that develops 100 flywheel HP.

## NEW INCREASED BUCKET CAPACITY

An 11% increase on the 977H with new 2½-cu.-yd. bucket—and a 16.6% increase on the 955H with new 1¾-cu.-yd. bucket. To handle the heavier loads, bucket linkage on both machines has been strengthened.

## NEW HEAVY-DUTY UNDERCARRIAGE

Built to stand up under the toughest jobs, the new undercarriage on both machines features larger, stronger track components that also increase stability...life-time lubricated rollers that need no lubrication until rebuilding...and track guiding guards welded to the roller frame for positive track alignment. The 955H also features a new 6-roller track frame.

## FAST TRAVEL SPEEDS

977H... Forward		955H... Forward	
Low	High	Low	High
2.0 MPH 1st	2.5 MPH 1st	2.1 MPH 1st	2.7 MPH 1st
3.6 MPH 2nd	4.7 MPH 2nd	3.9 MPH 2nd	4.9 MPH 2nd

Reverse speeds 25% faster than forward

## MORE HIGH PRODUCTION FEATURES

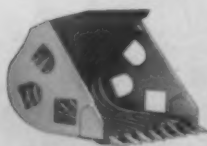
Other features on both machines include a new, two-cylinder high-speed gasoline starting engine for positive starts in any weather...and a new, dry-type air cleaner that removes 99.8% of all dirt from intake air even in the worst dust conditions, cuts maintenance time as much as 75%. Retained features include 40° bucket tilt back...automatic bucket positioners and kick out...3-grouser track shoes...and quick-change attachments that multiply the machines' usefulness.

# PACE-SETTING POWER PLUS VERSATILITY

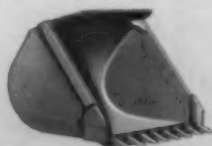
*in the new Cat Series H Traxcavators*



**SIDE DUMP BUCKET** Directly interchangeable with the standard bucket, the side dump bucket provides increased versatility for Series H Traxcavators. It eliminates turning and requires less loading space—to sum up, lowers cycle times for even greater production. Capacities: 977H—2½ cu. yd.; 955H—1¾ cu. yd.



Rock Bucket



Quarry Bucket



Bulldozer



Fork



Ripper

You've seen how increased horsepower, power shift transmission and Live Action Hydraulics make the new 977 and 955 Series H Traxcavators the fastest working tractor-loaders in the field. That means higher production for you not just on one job application, but on many—because of the many attachments available with both machines. Bar none, Traxcavators are the most useful machines you can own. With attachments, you can always keep them working—and working *profitably*.

Have you checked your equipment line-up recently? There may be machines in it that are no longer paying their way—or not earning *all* the profits they should in light of today's more efficient units. A comparison of your existing tractor-loaders with the new Series H Traxcavators might easily prove these new machines would increase your output and profits far more than you imagine.

Get the down-to-earth facts about the new Series H Traxcavators from your Caterpillar Dealer. Better still, ask for a demonstration. See for yourself how they set a new production pace on the toughest kind of job!

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

## CATERPILLAR

Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

**BORN OF RESEARCH  
PROVED IN THE FIELD**



# NEW PRODUCTS

Listed here are reviews of new and improved equipment items, selected to aid our readers in purchasing. See reader service numbers on enclosed postcard.\*



Walker-Cline Sidedozer

## Walker-Cline Sidedozer

Known as the Walker-Cline sidedozer, Easley Engineering and Mfg. Co. has announced the production of a versatile tractor attachment that can be used in earth moving, and building and maintaining roads.

Designed to perform work usually done by hand, the device can be used for grading under guard rails, back filling of shallow trenches, and finish grading curb areas. Hydraulically operated, the horizontal and vertical positions or motions are controlled by separate hand valves. Light in weight and inexpensive, this unit can be easily attached or removed in a few minutes, leaving the tractor for other jobs. The blade stroke is four feet outside the tire tread and the depth of the cut is 10 in.

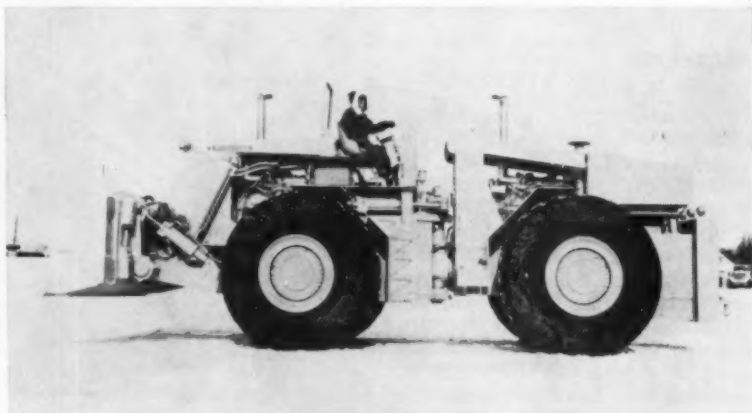
Easley Engineering & Mfg. Co.,  
2440 Goodrich Ave., Ferndale 20, Mich.

For more details circle 101 on  
Enclosed Return Postal Card.

## International Earthmover

Still considered an experimental project, International Harvester has announced a new earth mover, the PD-105, that will travel up to 25 mph and turn in the same circle as a large American car.

Powered by two 375 hp diesel en-



International Earthmover

gines, the pusher-dozer is a combination of two two-wheeled tractors built back to back. Now being used as individual units, the machine has frame steering and the ability to operate either forward or backward. The seat, steering wheel, accelerator and brakes are mounted on a turret which turns on roller bearings. Transmissions are single stage, torque converter driven, power shift systems, providing four speeds forward and reverse. Under favorable conditions the rig can push or pull about 90,000 lb., about 65 percent of its gross weight.

International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

For more details circle 102 on  
Enclosed Return Postal Card.

## Prime Mower

With the introduction of a new 430 hp, V-12 diesel engine as standard equipment, the LeTourneau-Westinghouse Model B Tournapull becomes a 29-yd. companion to the company's "V-Power" C.

A 28 percent increase in horsepower over the previous model with standard "in-line" engine is reported to account for improvement in overall performance. Mechanical improvements include large final drive gears and faces on pinion and bull gears measuring 5 1/4 in. across. A new radiator offers 50 percent more cooling surface than the previ-

\*To readers outside of the United States—postal rules forbid use of business reply cards outside of the U.S. Please write to us listing the numbers, month and name of magazine, and mail with your name and address to Inquiry Dept., Roads and Streets, 22 W. Maple St., Chicago 10, Ill., U.S.A.



L-W "V-Power" B Tournapull

ous models; a three section hood is said to be easily removable, and twin Donaldson dry type air cleaners are standard equipment. A high inertia steering motor automatically provides two rates of steer: slow for controlled "no-whip" steering at high travel speed, and quick sharp steer when needed for maneuvering in tight spots. Capacity of the B Fullpak scraper has been increased from 21 to 23 cu. yd.; heaped it carries 29 yd.

The engine is a General Motors Model 12V-71, a 2-stroke design of 851 cu. in. displacement; it develops 430 hp at 2,100 rpm and reaches a torque peak of 1,210 ft. lb. at 1,200.

LeTourneau-Westinghouse Company, Peoria, Ill.

For more details circle 103 on  
Enclosed Return Postal Card.

## Flex-Trac

A rough-terrain truck that bends in the middle and is capable of climbing a 3 ft. high wall was unveiled by the Clark Equipment Co.

Designed in Switzerland, the vehicle's wall climbing ability stems from an articulated construction which permits any one of the three pairs of wheels, all of which drive, to be raised from the ground. All six wheels can be made to turn together or separately. The manufacturer states that the vehicle, called a Flex-Trac, will traverse a 45 deg. grade or slide slope, "swim" across rivers, drive through mud and snow and travel 56 mph over highways. The power consists of a standard six-cylinder automobile

engine, a foot-operated clutch and two gear boxes which provide thirteen forward speeds and four reverse speeds.

Clark Equipment Co., Construction Machinery Div., Benton Harbor, Mich.

For more details circle 104 on  
Enclosed Return Postal Card.

## Piston Rings

A new line of heavy-duty non-severe TriCrome<sup>®</sup> piston rings engineered by Wisconsin Motor Corporation permits correct re-ringing of Wisconsin engines having moderately tapered, worn or out of round cylinders while eliminating re-boring.

The use of full-chromed rings in

three of the four grooves is said to restore engine compression and power. Other benefits include longer ring and cylinder life and improved engine efficiency and performance in heavy-duty power applications. The ring sets are pre-lapped for fast seating and are designed to meet the exact psi requirements for the firm's air cooled engines, the maker states. Torsional design is said to prevent rocking in the grooves and assures a three-point seal in the top grooves, thus preventing blow-by and loss of compression.

Wisconsin Motor Corporation, Milwaukee 46, Wis.

For more details circle 105 on  
Enclosed Return Postal Card.

## Front End Loader

Allis-Chalmers has made available a new TL-12 front end wheel loader with four wheel drive, a carry capacity of 4,000 lb. and a static lifting capacity of 9,500 lb.

The unit has power reversing tractoromatic transmission; four speeds forward are provided to 21.2 mph. and four reverse speeds to 27.9 mph. This transmission coupled with the 13-in. single stage torque converter having a 3 to 1 ratio, assures correct operating speeds for varied conditions. The loader is equipped with a pneumatic coupling which provides flexible, vibration-free connection between the engine flywheel and the torque converter, the manufacturer states. The unit is available with either A-C 77 hp or 76.5 hp diesel engines. Shipping weight of the diesel powered loader is approximately 11,550 lb. Four buckets are available with the unit, ranging from 1 to 2 cu. yd. capacities. Bucket tip-back at carrying height is 47 deg. with up to 14,500 lb. of breakout force at cutting edge.



Flex-Trac Truck



A-C TL-12 Loader

Maximum dumping clearance under the cutting edge is 8 ft. 4 in.; under hinge pin it is 10 ft. 3 in. At maximum dumping height, reach from the front of tires to the cutting edge is 2 ft. 8½ in. Turning radius is 19 ft. 5 in. with bucket in carry position.

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

For more details circle 106 on Enclosed Return Postal Card.

### Seal Coater

Cementing metal to road surface to obtain wearing and nonskid surface is the purpose of the new "Sealcoater" by Cartwright, a product of the Berry Corporation.

The unit is reported to save on material costs by eliminating solvents and excess chips. The unit trails a dump truck moving forward on an uncovered road. Capacity of the unit's tank is rated to match size of dump truck used.



Cartwright "Sealcoater"

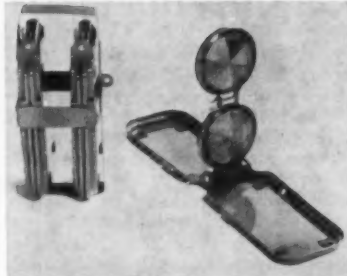
Trailer tank should be used to supply hot material through a boom to man-hole of unit while changing dump trucks. Precise joints are said to be made automatically and number of joints greatly reduced through long continuous coverage, dependent upon the size of dump truck used.

Berry Corporation, Stone Rd., Lexington, Ky.

For more details circle 107 on Enclosed Return Postal Card.

### Reflector Flare Kit

Latest I. C. C. regulations require all interstate commercial vehicles to carry emergency flares for roadside stops. This requirement may be met with the new Dietz No. 321 Reflector



Reflector Flare Kit

Flare Kit, consisting of three reflex reflector flares and a mounting bracket with provisions for locking. Kit is also available with three flags and flagstaves.

R. E. Dietz Co., 225 Wilkinson St., Syracuse 1, N. Y.

For more details circle 108 on Enclosed Return Postal Card.

### Power Shift Traxcavator

A new Traxcavator featuring a power shift transmission, has been announced by Caterpillar Tractor Co. The new machine is the 955 Series H, a 100 net hp unit.

The unit is powered by a compact, turbocharged 4 cyl. diesel engine. Bucket size has been increased from 1½ cu. yd. to 1¾ cu. yd. The new power shift transmission permits single lever shifting through all phases of the work cycle. Four work speeds are available with two gear speeds in both the high



Cat 955H-Traxcavator

and the low work ranges. Forward speeds are: low range, 0-2.08 mph and 0-3.86 mph; high range, 0-2.68 mph and 0-4.93 mph. Reverse speeds are: Low range, 0-2.62 mph and 0-4.83 mph; high range, 0-3.35 mph and 0-6.16 mph.

Retained features include automatic bucket positioner and kickout, 40 deg. tilt back and 47½ deg. tilt at maximum lift, three grouser track shoes and hydraulic track adjusters. Dumping height is 130 in., with a dumping reach of 41.2 in. at a 45 deg. discharge angle. A full line of attachments are available.

Caterpillar Tractor Company, Peoria, Ill.

For more details circle 109 on Enclosed Return Postal Card.

### Backfill Tampers

A new packing design said to increase service life almost 10 times, and

## LOOK TO FLINTKOTE FOR JET FUEL RESISTANT PAVEMENT SEALERS...

Send today for complete specifications and technical data sheets on the following:

#### • FLINTSEAL JFR\* (Hot poured)

A one-component, rubber-tar thermoplastic compound to be melted and poured. Cools quickly, retains tough, elastic bond in pavement joints and cracks through cycles of expansion and contraction. Fed. Spec. SS-S-167b.

#### • FLINTKOTE M-200 (Cold-Applied)

Two-component, polymer type sealer. Sets quickly, resists aircraft fuel, heat and blast from jets. Bonds perfectly to concrete and remains ductile at minus 20°F. Interim Fed. Spec. SS-S-00200a and pertinent Purchase Descriptions, as modified.

• Also ask about exciting new Flinteret†—Flintkote's polysulfide/epoxy concrete bonding compound for pavement restoration and repair.  
• And Flintar\*-coal tar pitch emulsion. Fed. Spec. R-P-00355a for sealcoating bituminous pavements. Write: The Flintkote Company, P. O. Box 157, Whippany, New Jersey.

\*Reg. U.S. Pat. Off. †T.M. of The Flintkote Company



Manufacturer of diversified products for home and industry

... for more details circle 304 on enclosed return postal card



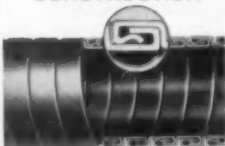
REPLACE AND  
SAVE WITH . . .

**Flexonics**

*Free-Flowing*  
**TAR &  
ASPHALT  
HOSE**

- Heat-Proof
- Leak-Proof
- $\frac{3}{4}$ " up to 12" I.D.
- Hose & Fittings to meet all equipment needs.

**SUPER STRENGTH  
FOUR WALL  
CONSTRUCTION**



Asbestos packed, inter-locked construction . . . provides maximum flexibility.

USED AS  
ORIGINAL  
EQUIPMENT

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1423 S. 3rd Ave., Maywood, Ill.  
Subsidiary of Calumet & Hecla, Inc.  
Send me complete T&A hose data and name of distributor nearest me.

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

. . . for more details circle 307 on enclosed return postal card

## New Products

a valve that delivers foot pound blows greater than any of the firm's previous models have been incorporated in Thor 66T backfill tampers, it was announced by the Thor Power Tool Company.

These air-powered percussion tools are equipped with upper and lower guide bushings and a set of "o" rings supporting a new type of packing material said to be virtually indestructible. These components are designed for solid alignment of working parts and to minimize stalling due to packing wear. Repair kits are available for installing the new assembly in Thor tampers now in use.

Thor Power Tool Company, 175 N. State St., Aurora, Ill.

For more details circle 110 on  
Enclosed Return Postal Card.

### Tandem Roller

The production of a new 4-6 ton tandem roller has been announced by General Engine Co.

Featured by the manufacturer is the roller's ability to work within  $\frac{3}{4}$  in. of buildings and foundation lines. Simple controls make the machine easy to



General's Tandem Roller

operate. With high clearance of curbs and the turning radius of  $14\frac{1}{2}$  ft., the machine is equipped with power steering, hydraulic brakes and simple forward and reverse transmission.

General Engines Co., Inc., U. S. Route 30, Thorofare, N. J.

For more details circle 111 on  
Enclosed Return Postal Card.

### Portable Conveyor Screen

A new portable conveyor-screening plant has been announced by Lipp-



Portable Conveyor-Screen

mann Engineering Works, Inc. Combining reciprocating feeder, conveyor, and vibrating screen, the entire unit can be transported from one location to another without dismantling.

Available with either bulldozer feeder trap or hopper, to accommodate overhead charging, the machine features both engine and drive at ground level. The manufacturer says that with five feed settings the device can produce clean, closely-sized aggregate at the rate of 50 yds. per hour. A four page brochure is available from the manufacturer.

Lippmann Engineering Works, Inc., Milwaukee, Wis.

For more details circle 112 on  
Enclosed Return Postal Card.

### Contraction Joints

A new method of forming contraction joints in concrete pavement has been developed by American Sisalkraft Corp.

Extruded vinyl strips can be vibrated into the concrete by a special machine. When the concrete has set, the strips are removed, creating a neat, uniform contraction joint. The vinyl strips are



Contraction Joints

composed of two sections, an outside V-shaped envelope and an insert T-shaped spreader strip. When the concrete has set, the T-shaped spreader strip is removed from the V-shaped envelope. This allows the walls of the envelope to collapse thereby permitting it to be easily and cleanly removed from the concrete.

B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, Ohio

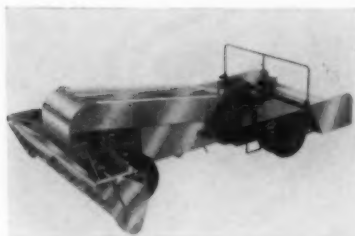
For more details circle 113 on  
Enclosed Return Postal Card.

### Chip Spreader

Recently released by Highway Equipment Company, is their new model "SP" self-propelled chip spreader for seal cast work.

A central control tower permits the operator to direct the power plant, conveyor, feed roll, feed augers, feedgate and hitch from a single operator's station. Material flow is synchronized to actual ground speed of the unit. A single, 36 in. wide mining type conveyor belt delivers the material in the spreading hopper. The rear hopper has a capacity of 3.5 cu. yd. struck and features a quickly adjustable feedgate to maintain the required amount of





Model "SP" Chip Spreader

material into the front hopper. It is reported that virtually all types of dump trucks on the road today will be able to automatically hitch and unload into the "SP".

Highway Equipment Company, 616 D Ave. N.W., Cedar Rapids, Iowa.

For more details circle 114 on Enclosed Return Postal Card.

## Replacement Tire

A new replacement on and off-the-highway tire for trucks, the Firestone All Traction Nylon truck tire, was announced by the Firestone Tire and Rubber Co.

The tire is suggested for use in operations where the truck is to be used about 90 per cent on paved roads. Constructed of three continuous center ribs, the new tire incorporates a tapered groove design. The company states that downtime may be reduced due to less tire failures. The tire will be available in sizes from 6:00-16 through 11:00-24.

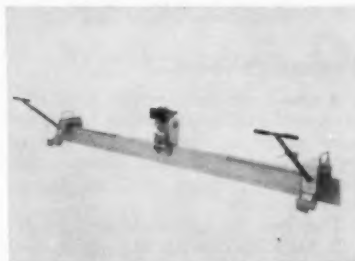
Firestone Tire & Rubber Co., 1200 Firestone Pkwy., Akron 17, Ohio

For more details circle 115 on Enclosed Return Postal Card.

## Vibrating Screed

The new Maginniss Vibrating Screed from Maginniss Power Tool Co., is said to produce uniform consolidation of concrete while striking off a smooth surface.

Low slump mixes, too stiff for manual screeding are claimed to be handled efficiently by the unit. The assembly consists of a vibrating unit and a pair of end dollies. These can be mounted on a 2 or 3 in. by 10 in. wood beam up to 36 feet long. An 8 ft. width adjustment of the dollies (4 ft. each end) is provided. Thus, when mounted on a 16 ft. beam, it is possible to screed slabs of any width between 8 and 16 ft. Standard power unit has a 2½ hp.



Maginniss Screed

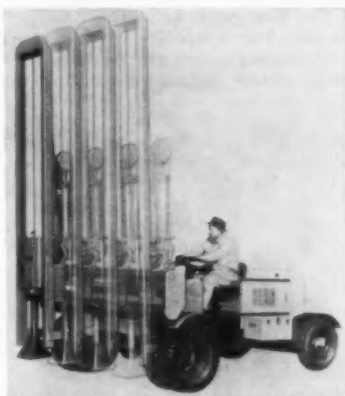
4 cycle air-cooled gasoline engine with 2 enclosed "V" belts driving the eccentric. Spring mountings isolate the engine from the vibrator. Vibration frequency on engine driven units is variable from 3,600 to 8,000 vpm.

Maginniss Power Tool Company, 154 Distl Ave., Mansfield, Ohio

For more details circle 116 on Enclosed Return Postal Card.

## Mobile Hydraulic Hammer

A new side-action mobile hydraulic hammer is presently being manufactured and marketed by Arrow Manufacturing Company. With this unit,



Arrow 130-AS Hammer

Model 130-AS, the operator has a 7-ft. working width when leads are vertical and 8-ft. when leads are angled.

The unit is designed to work close to piers, abutments, footings and etc. It can work from side to side across the front of the machine and forward or reverse. Control of the side action is hydraulic. Hammer can be shifted rapidly from side to side, the manufacturer reports. Lift of the 1,000 lb. hammer weight can be controlled from inches up to 9 ft. Hammer stroke control can be automatic or controlled manually. Other hydraulic features add to the unit's versatility. Hammer can be driven at highway speeds up to 30 mph.

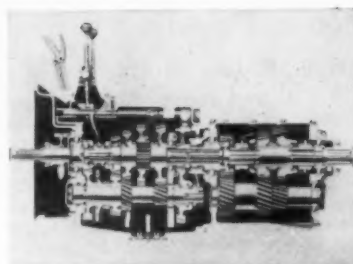
Arrow Manufacturing Company, 194 W. Dakota Ave., Denver 9, Colo.

For more details circle 117 on Enclosed Return Postal Card.

## Heavy-Duty Transmissions

Two new heavy-duty 15-speed transmissions for truck service are available from Fuller Manufacturing Company.

Designed for use in diesel powered trucks and tractors in the 1,120 cu. in. class, the new transmissions, models 15-G1120 and 15-H-1120, are designed especially for combination on and off-highway applications such as aggregates, ready mix concrete and construction. Advantages of the new transmissions include an extremely short installation dimension which will permit shorter wheelbase for tractors which formerly incorporated main and auxiliary transmissions; maximum op-



Fuller Heavy Duty Units

erational flexibility with 10 closely-spaced gear splits and 5 speeds available for low range operation through a deep reduction in the auxiliary; wide choice of optional gear ratios; weight reduction through elimination of support brackets, joints, cross members and a propeller shaft. Ratios of the 15-G-1120 vary from .64:1 in the highest gear to 17.25:1 in the lowest gear in the low range.

Fuller Manufacturing Company, Transmission Division, Kalamazoo, Mich.

For more details circle 118 on Enclosed Return Postal Card.

## Bulk Material Hauler

An expansion of its line has been announced by Highway Equipment Company with the addition of the Model "C" bulk material hauler.

This unit can be used for transporting and unloading materials of fine granular consistency, such as cement, flake gypsum, salt, pulverized lime, super phosphate and others. It is said to be suitable for windrowing, at the job site, cement and lime material used in soil stabilization road work. Four



Highway Hauler

body lengths are available: 8-ft., 11-ft., 13-ft. and 15-ft. with capabilities from 50 to 80 barrels. A 30-in., 4-ply rubber belt-over-chain conveyor assures a smooth flow of material to the discharge hopper, the manufacturer states. Loads can generally be discharged within 6 to 12 min. depending on material and size of load.

Highway Equipment Company, Dept. H48, 616 "D" Avenue, N.W., Cedar Rapids, Iowa.

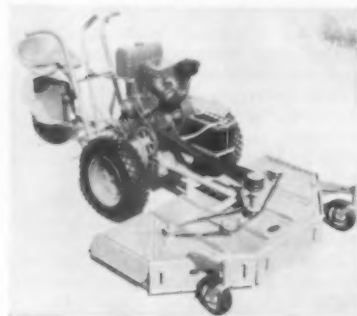
For more details circle 119 on Enclosed Return Postal Card.

## New Products

### 60-in. Riding Mower

An all steel rotary mower of extra heavy duty type is the Series H1250-60 in. riding mower from the Kut Kwick Corporation.

The unit is self-propelled and features single lever control, five speeds forward, neutral and reverse. Blades are of one-piece construction and of high quality steel designed to cut dense grass, weeds and similar growths. En-



Kut Kwick Mower

gine is the Model AGN, 12.50 hp Wisconsin with 12 v electric starter and generator. Width of cut is 60 in., designed to trim right or left side; height of cut is 1½ to 3½ in. Travel speed in the forward range is from 1 to 5 mph with engine at full throttle. Forward motion is controllable by operator with a moving lever. No stopping is necessary for de-clutching and/or gear shifting.

Kut Kwick Corp., Brunswick, Ga.

For more details circle 120 on Enclosed Return Postal Card.

### Front End Loader

Latest addition to the 100 hp Eimco 103 series of crawler tractors manufactured by the Eimco Corporation is their model 123 front end loader.

This 74 in. machine has a bucket capacity of 20,000 lb. at carry position and maximum breakout force, with the bucket heeled on the ground, of 25,000 lb. Sand and gravel bucket capacity has an SAE rating of 2¼ cu. yd.; the rock bucket a 2 cu. yd. capacity and 2¼ yd. heaped capacity. The unit has a working weight of 29,200 lb., features loader arms, main frame, final drive and center housing of steel with no bolts or welds. Power is transmitted through "Unidrive" transmission and



Eimco 103 Loader

"Quadra-Torque" giving four speeds in both forward and reverse, flip-of-lever gear and direction changes, and a speed range of from zero to 6.5 mph through the single stage industrial torque converter, standard on all units.

The Eimco Corporation, P. O. Box 300, Salt Lake City 4, Utah.

For more details circle 121 on Enclosed Return Postal Card.

### Trailer Gears

A new series of trailer landing gears with 50,000 lb. capacity has been announced by the Binkley Co., Warrenton, Mo.

The new gears, known as "Big 50" because of their capacity, are designated the 39000 series and are available in a complete line with mount and travel



Trailer Landing Gear

characteristics to meet basic requirements. This gear enables a man to lift up to 50,000 lb. by manually turning the crank. Designed to have few moving parts, the device uses the Saginaw ball bearing screw, and is delivered pre-lubricated.

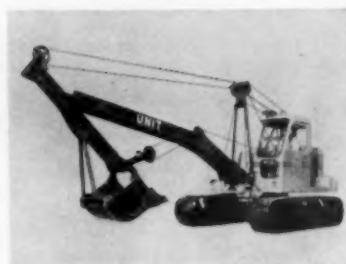
Binkley Co., Warrenton, Mo.

For more details circle 122 on Enclosed Return Postal Card.

### Convertible Shovel

Unit Model 1220, a ¾ yard shovel, convertible to crane, dragline, trencher, clamshell, and magnet attachments, is available from Unit Crane & Shovel Corp.

The shovel is equipped with a new 17¾ in. diam. by 5 in. wide brake. Disc-type clutches are mounted on high speed countershafts; 44 large-type teeth are incorporated in the newly designed clutch discs. Use of spring cups eliminate any clutch spring breakage, it is reported. Features include one piece cast gear case enclosing all gears and shafts which operate in a constant bath of lubricant; straight-in-line mounting of gas or diesel engines with main machinery; full vision safety cab; six independently adjusted hook rollers;



Unit Model 1220

all-welded constructed turntable; automatic traction brakes providing a friction type locking device for both crawlers; splined shafts throughout; and wide use of drop-forged and heat-treated parts. Torque converter provides instant and accurate control. Independent boom hoist permits power raising and controlled lowering of boom at high speeds.

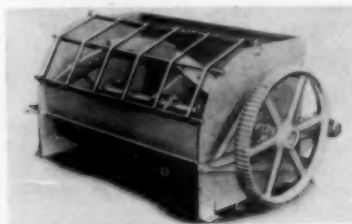
Unit Crane & Shovel Corp., Milwaukee, Wisconsin.

For more details circle 123 on Enclosed Return Postal Card.

### Cement Mixers

Innovations based on time-tested engineering principles are said to have resulted in economy and durability for a new line of standard cement mixers for General Engines Co.

Removable parts are featured in the new mixers: mixer bowls are provided with heavy liners said to be easily replaceable; ends are also lined to assure



General Engines Mixer

protection. Adjustable paddle blades can be set to give fast mixing with minimum of power, the manufacturer states. Mixer bowl is of all-steel plate construction, rolled and welded to form a solid, one-piece unit. Dry batch construction mixers are available in sizes from 15 to 60 cu. ft. capacity.

General Engines Co., Rt. 130, Thorofare, N.J.

For more details circle 124 on Enclosed Return Postal Card.

### Tractor Shovel

A new heavy-duty, rubber tired tractor shovel with short turning radius has been added to the Michigan line of equipment from the Construction Equipment Division of Clark Equipment Company.

The new unit, "Michigan" Model 55B, has a lift capacity of 5,400 lb. and is equipped with a 1 yd. bucket; the 15 ft. 8 in.-long unit has a turning



"Michigan" 55B Tractor-Shovel

radius of 11 ft. 2 in. Capable of travel up to 26 mph in either forward or reverse, the tractor is powered by a 66.5 hp gasoline engine. It has bucket wheel drive with planetary gear reduction in the driving wheels. It also features "Michigan" power train with torque converter and power shift. The new model has a working weight of 10,200 lb. Maximum dumping height is 8 ft.

Construction Machinery Division, Clark Equipment Company, Pipestone Rd., Benton Harbor, Mich.

For more details circle 125 on Enclosed Return Postal Card.

### Truck Mixer

This short-base truck mixer, manufactured by Jaeger Machine Co., provides legal loading without frame distortion on a short wheelbase.

Shorter mounting is achieved by a short, large diameter drum which is mounted on drum rollers cantilevered beyond their cradles. Available with 6, 6½ and 7 yd. mixers, this unit has



Jaeger "Short-Base"

a gvw of 45,500 lb. with 6 yd. of 4,050 lb. concrete and 100 gal. of water. This puts 31,500 lb. on rear axles and 4,000 lb. on the front. PTO drive, either flywheel or front-of-engine, makes possible minimum spacing between cab and mixer. Air-pressure water tank, either side or overhead mounted, is operated by the truck's air compressor, eliminating the need for a water pump.

Jaeger Machine Co., Columbus 16, Ohio

For more details circle 126 on Enclosed Return Postal Card.

### Spiral Carbide Drills

To supplement its line of fast spiral carbide drills, the Rawlplug Co. has introduced a spiral carbide-tipped masonry drill with deep flutes and closely-controlled diameters.

Engineered to combine strength with drilling speed, the deep, wide flutes of the new drills are said to quickly clear

flaky or gummy cuttings from materials like tile or asphalt. For support against shock the drills have brazed-in carbide tips. The pivot point, at the geometric center of the carbide tip, directs the full force behind the drill against the center of the tip for fast drilling with little tendency to "walk." Drill diameters range from .132 to 1.535 in. and overall lengths from 2½ in. to 10 in. The sizes available include ¼ in. to 1½ in.

The Rawlplug Co., Inc., New Rochelle, New York

For more details circle 127 on Enclosed Return Postal Card.

### Side Boom

A custom engineered wheeled tractor, the Blue Ox side boom has been introduced by FWD Corporation. The unit is designed for use in pipe stringing, lowering-in operations and pipeline repair work.

The center of gravity in the unit is low, to assure maximum stability when wielding heavy side loads. Also, the vehicle features a hydraulically controlled counter weight. Side boom has lift capacity of 17,500 lb. Features of the new unit include 4-wheel drive and 4 wheel steer plus independent (or simultaneous) controlled right and left hand breaks to allow shortest possible turning radius. High flotation tires permit the unit to operate on city



FWD Blue Ox

streets without damage to pavement, maker states. Driver is seated behind boom for good visibility and control of boom action. Road speeds of up to 47 mph are possible while a low range auxiliary provides creep speeds of ½ mph with an overall reduction of 798:1. Optional Equipment includes a back-fill blade, hydraulic stabilizers and 16:00 x 20-14 ply tires.

FWD Corporation, Clintonville, Wis.

For more details circle 128 on Enclosed Return Postal Card.

### Optional Trench Hoe

Optional trench hoe attachments with hydraulically actuated buckets are now available from Little Giant Crane and Shovel, Inc.

Five sizes range from 7 to 17½ tons and feature bucket sizes from ⅓ to ¾ yd. The hydraulic cylinder is operated

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... for more details circle 348 on enclosed return postal card



## New Products



Optional Trench Hoe

through an electro-servo valve giving push button control. Articulated buckets allow the operator to adjust the pitch of the bucket instantaneously. This feature permits bucket adjustment that gives deep digging and makes possible straight side excavation and undercutting around obstructions. Offering digging depths from 15 ft. with a 1/3 yd. Model L and up to 21 ft. with a 5/8 yd. Model 48, the hoe boom is boxed around a heavy H beam backbone to insure strength.

Little Giant Crane & Shovel, Inc.,  
Des Moines, Iowa

For more details circle 129 on  
Enclosed Return Postal Card.

## Vibratory Screed

Available in 8, 10 or 12 ft. widths this screed, manufactured by Vibro-Plus Products, Inc., is designed to handle stiff, harsh concrete mixes.

The manufacturer states that it is



Vibratory Screed

ideal for bridge slabs, small road jobs or precast or prestressed hollow core slabs. The screed can be powered by either a gasoline or an electric motor.

Vibro-Plus Products, Inc., Stan-  
hope, N. J.

For more details circle 130 on  
Enclosed Return Postal Card.

## Elevating Grader

An Elevating grader with a loading capacity up to 900 cu. yd. per hour was recently introduced by Ulrich Manufacturing Co.

Designated the Domor Model 64, the new machine features a 48 in. belt, 36 in. disc and high belt speed. A new mechanical arrangement on the Model 64 prevents accidentally damaging the loading belt with the plow disc during operations. This is accomplished by a pivoted connection between the lower



Model 64

end of the conveyor and the disc beam which keeps the disc at a predetermined distance from the belt, completely eliminating the hazard of accidental belt cutting. The conveyor frame members and sideboards are of one piece construction. Conveyor lengths up to 31 ft. are available as needed.

Ulrich Manufacturing Co., Roanoke,  
Illinois

For more details circle 131 on  
Enclosed Return Postal Card.

## Hydraulic Bullgrader

A hydraulic bullgrader for use with the International T-340 crawler tractor is available from the International Harvester Export Company.

The unit is 85 1/4 in. wide and heavily reinforced for high capacity earth-moving. Only two control levers are needed to deliver a wide range of angle, tilt and height adjustments. The blade can be set to a depth of 11 1/4 in. below grade and raised to a height of 35 in. above grade. Angl-



I. H. Hydraulic Bullgrader

ing positions vary from 25 deg. to the right to 25 deg. to left. The bullgrader is mounted on the T-340 by means of a heavy sub-frame assembly which distributes the shocks and strains of heavy dozing along the entire unit, the manufacturer reports. Rear of the sub-frame is bolted to the final drive housing, while front of frame ends in a heavy, box-sectioned C-frame assembly to which the blade is pinned. A 6-in high cutting edge is reversible. International Harvester Export Company, 180 N. Michigan Ave., Chicago 1, Ill.

For more details circle 132 on  
Enclosed Return Postal Card.

## Curbmaster

A new machine for pouring curbs and gutters and widening slabs up to



10 ft. has been introduced by the Iowa Construction Equipment Corp.

Claiming peak versatility, it materially cuts down pouring time. Additional heads are available for cutting and compacting subgrades. The machine provides one-man operation and one-pass production. The manufacturer points out that it has been approved by safety engineers.

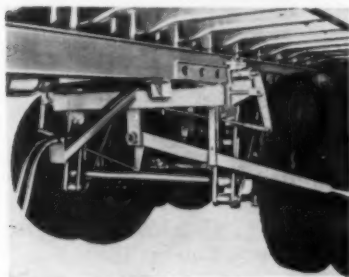
**Iowa Construction Equipment Corp., Cedar Falls, Iowa**

For more details circle 133 on Enclosed Return Postal Card.

## Tandem Bearings

Adjustable underconstruction of tandem trailers is achieved through the use of new lubricated bronze bearings, according to the Fruehauf Trailer Co.

Select-A-Point allows an operator to change tandem locations and balance cargo in a matter of minutes. The unit



Adjustable Tandem

is adaptable to the firms new or earlier trailer models. The grease coated bearings insure a smooth gliding action for the tandem as it is moved along the main sub-frame rail to the desired position.

**Fruehauf Trailer Co., Detroit 32, Mich.**

For more details circle 134 on Enclosed Return Postal Card.

## Motor Wagon

An all new TR-160 rear dump motor wagon has been added to the Allis-Chalmers construction machinery line. The unit has a carrying capacity of 12 tons—7.7 cu. yd. struck and 12 cu. yd. heaped.

The wagon is powered by a 6-cyl. A-C supercharged engine rated 155 hp at 2,200 rpm. Shipping weight is 28,100 lb. A 5-speed constant mesh transmission provides forward speeds from 3 to 25.4 mph and reverse at 3 mph. The 7 ft. 11 in. wide unit can make a non-



A-C Rear Dump

stop 180 deg. turn in 22 ft. 8 in. with a  $\frac{1}{8}$  turn of the steering wheel. A lesser turn regulates hydraulic power to the double-acting steering jacks for smooth control at fast haul speeds, the maker states. Hydraulic power is provided by a tandem pump which is gear driven from the rear of the engine crankshaft for fast controlled response for positive steering and dumping operations. Full-flow filtering is included to assure clean oil and efficient operation of all controls. To permit greater use value, the rear dump wagon is quickly interchangeable with the 7 cu. yd. S-160 scraper.

**Allis-Chalmers Manufacturing Company, Public Relations Division, Milwaukee 1, Wis.**

For more details circle 135 on Enclosed Return Postal Card.

## Striping Machine

A self-propelled, one-man operated striping machine, the Master 10, is offered by the M-B Corporation.

Key feature is the machine width which is only 50 in. overall, so that traffic is not blocked in either lane and unit can easily maneuver in heavy traffic and congested areas, the maker



M-B Master 10

states. Designed for laying center lines, the unit lays one, two or three lines 3 in. to 6 in. wide in one or two colors. Lines may be painted solid or intermittent with skip line attachment for automatic gun control. The unit has three speeds forward up to 10 mph. It is powered by a 21.5 hp engine and has a 55 cf displacement compressor.

**M-B Corporation, New Holstein, Wis.**

For more details circle 136 on Enclosed Return Postal Card.

## Traffic Routing Devices

"Packaged protection" for traffic routing on streets and highways is offered in two new products announced by Mine Safety Appliance Company. These products are the M-S-A Linemarker and the M-S-A Signal-Lite.

The Linemarker is a 13½ in. high flag assembly mounted on a stable cadmium-plated steel base. A spring holder returns the flagstaff to up-right position after every impact, the maker states. The Signal-Lite Road Marker features a reflective aluminum panel mounted by means of a spring frame. A warning light is attached to the top



M-S-A Signal-Lite Road Marker

of the frame. This unit is designed to collapse undamaged if accidentally run over, and to withstand wind velocities up to 40 mph. Reflective surfaces meet I.C.C. standards for night visibility.

**Mine Safety Appliances Company, 201 N. Braddock Ave., Pittsburgh 8, Pa.**

For more details circle 137 on Enclosed Return Postal Card.

## Paint Striper

This diversified paint striper, the Dearborn, is manufactured by R. E. Muncey, Inc. The unit paints straight lines, circles and curves for painting of parking lots, metered parking areas, street crosswalks, etc.

Maneuvered with one-man operation, the lines are painted with a felt applicator roller. Interchangeable optional equipment includes 1 in., 2 in., 2¼



Dearborn Paint Striper

in., 3 in. and 4 in. width striping rollers; 3 in. diam. rear swivel casters; and 8 in. diam. rigid rear wheels which facilitate movement of the machine in large areas. The unit is a friction drive machine requiring no gasoline or electric motor. Construction is of aluminum and steel with weight approximately 35 lb.

**R. E. Muncey, Inc., P.O. Box 387, Birmingham, Mich.**

For more details circle 138 on Enclosed Return Postal Card.

## New Products

### Four Wheel Drive Tractor

The new Model 250A Westfall tractor from Westfall Equipment Co. features positive four wheel drive, each wheel having locked momentum features said to preclude wheel spinning out.

Engine is a Cummins diesel, NH-220-BI, 220 hp, 2,100 rpm. Axles are Westfall, forged, high tensile steel. Steering is controlled by standard steering



Westfall Tractor

wheel with hydraulic power assist. There is no caster or camber in the steerable wheels, so the tractor can be driven in either direction at full rated speed, plus declutch and brake for sharp pivot turns. Transmission is also Westfall, all clutch power shift with Twin Disc torque converter or fluid coupling. The unit has 8 speeds forward at 0 to 31.5 mph and 4 speeds reverse at 0 to 25 mph.

Westfall Equipment Company, A-1 437 N. Columbia Blvd., Portland, Ore.

For more details circle 140 on Enclosed Return Postal Card.

### Curbing Machine

A heavy-duty line of Stephens-Canfield Curbing Machines that lay concrete or asphalt curbs by the extrusion method has been introduced by Power Curbers, Inc.

These new machines feature heavy components in the power train which permit the laying of wide, high compaction curb at speeds of up to 12 fpm. There is a removable hopper for ease of maintenance, and a new "no stress" auger or compaction screw that gives long life and reduces wear and tear on the machine, the manufacturer states.

The curber eliminates forms, because it extrudes either asphalt or concrete



Stephens-Canfield Curber

curb in its final shape. The relatively dry Portland Cement concrete mix is zero slump, and a dense asphalt mix is used in order to withstand the wear and tear of modern-day traffic.

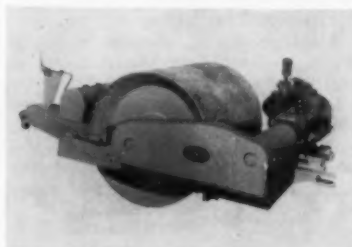
Power Curbers, Inc., P.O. Box 1465, Salisbury, N. C.

For more details circle 141 on Enclosed Return Postal Card.

### Vibratory Compactor

A new towed type vibratory compactor, Model VC80 is announced by Tampo Mfg. Co.

The unit features a fully variable vibration frequency range and a visible means of determining compaction effect. It is reported that the roller can be controlled to vibrate at the natural frequency of a soil mass to obtain high compaction efficiency. Specifications in-



Model VC-80 Compactor

clude a rolling width of 60 in., 7,000 lb. gross weight, and compacting power of up to 80 tons. The unit is powered by an air-cooled gasoline engine of 36 hp. An integral unit vibrating mechanism is lubricated by pressure fittings, and the Tampo Vibra-Meter is furnished as standard equipment.

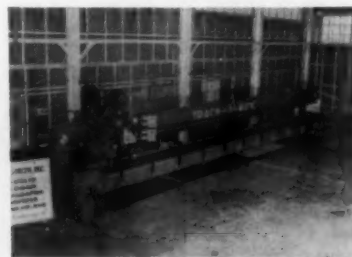
Tampo Manufacturing Company, P.O. Box 4248 Sta. A, San Antonio 7, Texas

For more details circle 142 on Enclosed Return Postal Card.

### Track Welding Unit

Automatic Welding Company, announces the development of a new automatic-set template positioner attachment on their Twin Track-O-Matic welding unit, that reduces the time required in this operation by up to 80 percent, the manufacturer states.

The unit is a specially designed welding machine used to resurface the rails on crawler tractor tracks to original dimensions for extra wear. With its several new features, it can complete a



Track-O-Matic Unit

rail of any size and type crawler tractor without remounting or rehandling. Twin welding heads permit rebuilding top surface of both track rails simultaneously, as well as two rail side edges simultaneously.

Automatic Welding Company, Waukesha, Wisconsin.

For more details circle 143 on Enclosed Return Postal Card.

### Cutting Torch

The Harris Calorific Company announces the development of a lightweight top-lever fitter's cutting torch.

Known as the Model 42, the torch is planned for one-hand operation because the cutting lever is mounted forward and on top for better grip and balance. The torch features triangle tube construction, silver-soldered joints throughout and "o" ring seal in the



Harris Cutting Torch

high pressure plunger chamber. The unit is available in 3 models: the 42 for acetylene, the 42-F for propane and the 42-N for low pressure natural gas cutting. Cutting capacity up to 8 in. is available with tips for gouging, rivet washing, rivet cutting and thin plate cutting.

Harris Calorific Company, 5490 Cass Ave., N.W., Cleveland Ohio.

For more details circle 144 on Enclosed Return Postal Card.

### AC Generators

A new series of combination electric motor and 60 cycle AC generators has been developed by Kato Engineering Co.

Designed to be used in pairs, they provide a continuous source of AC current. The out put is 10 kva and the speed is 1760 rpm. To provide against any failure, the generator is driven by a gasoline or diesel engine which is automatically brought up to proper speed so that the frequency dip will not exceed approximately five or six



AC Generator

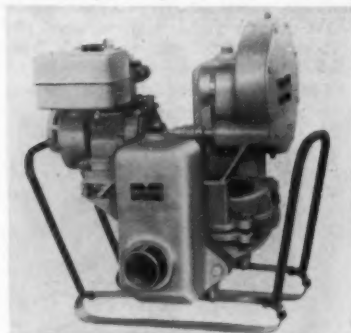
cycles. A flywheel is used to minimize the dip in frequency and voltage when normal power fails. The generators are powered with either single phase or three phase induction low-slip motors.  
Kato Engineering Co., Mankato, Minn.

For more details circle 145 on  
Enclosed Return Postal Card.

## Diaphragm Pump

A new lightweight diaphragm pump with 3 in. connections and a capacity rating of 4,300 gal. per hour is produced by the Midland Products Co.

Equipped with a 3 hp gasoline engine and constructed of aluminum alloy, these pumps are mounted on vibration-proof spring skids for steady



Midland's Diaphragm Pump

footing. The manufacturer states that these pumps are ideal for pumping of sludge, slurries and debris laden liquids and are equipped with suction and discharge chambers which will eliminate jerking of the suction hose to produce a smooth flow of the discharge line.

Midland Products Co., Rt. 17, Mahwah, N. J.

For more details circle 146 on  
Enclosed Return Postal Card.

## Portable Crusher

Diamond Iron Works now has available their new model 70 portable crusher.

This crusher, which has an acceptable road weight of approximately 55,000 lb., is a closed-circuit, rotor-lift plant which has a capacity exceeding 175 cu. yd. of material per hour passing a 1 in. screen based on 25 percent oversize. Featured component units



Model 70, Crusher

are a 10 in. by 36 in. jaw crusher, 32 in. by 24 in. star gear roll crusher, 21½ deck, 4 ft. x 12 ft. vibrating screen and 30 in. wide belt conveyors throughout.

Diamond Iron Works, Halsted St. & 48th Pl., Chicago 9, Ill.

For more details circle 147 on  
Enclosed Return Postal Card.

## Gunning Rigs

Ridley and Co., Inc. has announced the introduction of two new rigs designed to make possible quick repairs of damaged concrete work, and at the same time have the capability of supplying full concrete gunning capacity for construction work of various types with municipal crews.

The new units, Model C3VM (truck-



Ridley Model C3VM

mounted) and C3TM (trailer-mounted) will shoot concrete at a rate of from 8 to 12 tph employing a 365 cfm compressor. The rigs are said to be simple to operate and extremely compact. A continuous feed operation allows a minimum crew to shoot as little as a one sack batch or up to 18 tph when supplied with 600 cfm of air and pre-mixed or ready-mixed materials.

Ridley and Co., Inc., c/o J. W. Watson, Advertising and Public Relations, 3932 Wilshire Blvd., Los Angeles 2, Calif.

For more details circle 148 on  
Enclosed Return Postal Card.

## Standards and Equipment

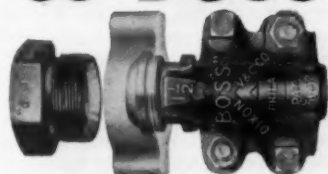
A complete line of tapered steel lighting standards, mast arms and brackets for street, highway and commercial lighting is available from Valley Manufacturing Company.

Specific products include lighting standards, mast arms, bracket arms, strain poles, signal support arms and others; also included are tapered poles in steel of 3, 7 or 11 gauge. The tapered steel products are reported to meet or exceed current standards of the lighting industry.

Valley Manufacturing Company, Valley, Nebr.

For more details circle 149 on  
Enclosed Return Postal Card.

# "GJ-BOSS"



GROUND-JOINT FEMALE COUPLING, STYLE X-34

so *Reliable*  
FOR PILE DRIVING

...AND ANY  
STEAM, AIR,  
WATER AND  
HYDRAULIC  
SERVICES...  
HIGH OR LOW  
PRESSURE

*Washerless*



Unequaled for safety, efficiency and long service life. Ground-joint union between stem and spud provides leak-proof, trouble-free seal... no lost or worn-out washers to replace. All parts malleable iron or steel, rustproofed. Furnished with superstrong "Boss" Offset and Interlocking Clamps. Sizes ¼" to 6", inclusive.

## COMPANION MALE COUPLING

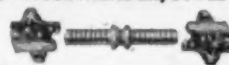
"BOSS"

STYLE MX-16



Companion coupling for "GJ-Boss", described above, and "Boss" Washer Type Couplings Style W-16. Each size fits same size hose... oversize hose not required. Furnished with "Boss" Offset and Interlocking Clamp. Sizes ¼" to 6", inclusive.

## "BOSS" HOSE MENDER, STYLE BM-16



The practical, safe way to restore damaged hose to service. Fitting consists of corrugated mender tube and two "Boss" Interlocking Clamps. Tube has flanges to engage clamp fingers. Thoroughly rustproofed. Sizes ½" to 6"

Stocked by Manufacturers and Distributors  
of Industrial Rubber Products

**DIXON**  
*Valve & Coupling Co.*

GENERAL OFFICES & FACTORY—PHILADELPHIA 22 PA.  
BRANCHES—CHICAGO • BIRMINGHAM • LOS ANGELES • HOUSTON  
DIXON VALVE & COUPLING CO. LTD. TORONTO Associate Companies  
Buck Iron Company, Inc. Garyville, Pa. • Precision Steel Steel Company, Camden, N.J.



## New Products

### Box and Valve Locator

The Goldak Company, Inc. has announced a new, portable, transistorized box and valve locator, the Model 620T.

The unit is said to easily locate valves, manhole covers, valve risers, corner monuments, meters, curb boxes and other metallic masses that are concealed or underground. The transistorized receiver is packaged in a lightweight aluminum box, with precision-wound detection loops. A transistorized oscillator is contained within the oscillation head. Single tuning control



Goldak Locator

is reported to simplify operation and adjustment of the unit. The entire unit housed in a carrying case consists of amplifier box, carrying handle, detection head, earphones and operating instructions.

The Goldak Company, Inc., 1544 W. Glenoaks Blvd., Glendale, Calif.

For more details circle 150 on Enclosed Return Postal Card.

### Wide Sweep Mower

Heavy growth on 90 degree slopes is said to be removed effectively by this unit, the Devere TR, from the Devere Company.

The mower cuts a swath up to 60 in. wide in one pass and is designed for heavy duty grade mowing on steep



Devere TR Mower

inclines. This rotary mower is available in 37, 48 and 60 in. widths and with variable speed drive from 2 to 6 mph, one reverse, independent of the cutting unit. Three staggered steel blades are mounted in a pivoted cutting unit designed to follow ground contour. Other features include a three pinion differential completely sealed from dirt and dust, oversize rear axle and a 9 hp, four cycle engine; a 12½ hp engine is optional.

The Devere Company, Racine, Wis.

For more details circle 151 on Enclosed Return Postal Card.

### Maintenance Roller

A 3 to 5 ton and a 4 to 6 ton maintenance roller equipped with new heavy-duty 2-speed transmission and torque converters, are available from Shovel Supply Company.

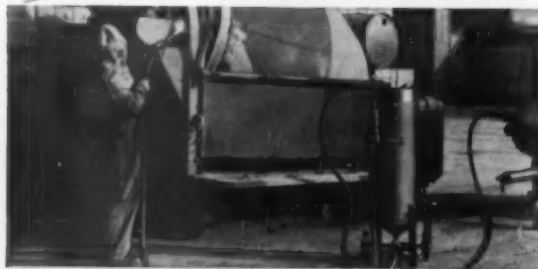
These rollers are quickly trailed at



Ferguson Portable Roller

### PREFERRED FOR

**Powerful Abrading Action**  
**RUEMELIN**



### SAND BLAST GENERATORS!

Rugged Ruemelin Generators produce a high velocity abrasive stream to meet all pressure blasting requirements. Remove rust scale, paint. Clean bridges and remove laitence from cement. Clean ready mix trucks and highway equipment prior to re-painting. Equipped with remote control with dead man valve for stop and start at the nozzle! Wet type nozzles also available if desired. Portable units can be equipped with hi-speed mountings for highway trailering.

Write for free bulletin on complete line.

### RUEMELIN MFG. CO.

3990 N. PALMER STREET MILWAUKEE 12, WIS., U. S. A.  
MANUFACTURERS AND ENGINEERS — SAND BLAST AND DUST  
COLLECTING EQUIPMENT — WELDING FUME COLLECTORS

For more details circle 351 on enclosed return postal card

### Newest and Finest Hotel in

# Arizona

In Scottsdale—the "West's Most Western Town"—12 miles northeast of Phoenix in the Camelback Mountain resort area.

100 luxury rooms and suites, all with private sun porch—many with kitchen facilities. Completely air-conditioned and heated—individually controlled.

Dining Room and Cocktail Lounge overlooking beautifully landscaped Patio. Heated Swimming Pool. 3 Golf Courses and horseback riding available—all sports and activities nearby.

Meeting room accommodating up to 200 persons. Can be sectioned off into smaller rooms for Committee Meetings, Conferences, etc.

EUROPEAN PLAN — OPEN YEAR AROUND

HOTEL

Rates on Request

SCOTTSDALE,  
ARIZONA

ROBERT FOEHL  
GEN. MANAGER

# Valley Ho





high speed from one job to another on pneumatic wheels which are raised or lowered by power driven hydraulic cylinders attached to each wheel. Front end of the roller is also hydraulically raised for attaching to truck for trailing. Steering is also hydraulic.

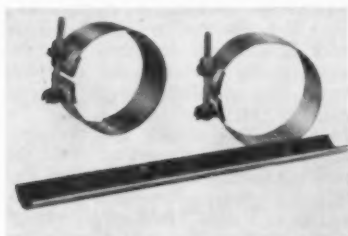
Shovel Supply Company, P.O. Box 1369, Dallas 21, Texas.

For more details circle 152 on Enclosed Return Postal Card.

## Pipe Leak Clamp

A new quick-bolting pipe leak clamp and a new strip-type gridded gasket with metal backing has been announced by Smith-Blair, Inc.

One clamp width and a gasket strip can be used to make repairs of any length in multiples of 3 in. Called a Redi-Clamp, it has a specially designed lug base that is flat so that crush pressure is minimized and a circumferential



Clamp & Gasket

pull is applied. The bolt remains in one lug and is snapped over the open slots of the opposite lug. These can be stocked in 3 in. band widths, and can be used to make clamps in any multiple of 3 in. length up to 30 in. The new gasket is made of 1/4 in. gridded neoprene and vulcanized to a 26 gauge stainless steel backing in the molding operation.

Smith-Blair, Inc., 535 Railroad Ave., South San Francisco, Calif.

For more details circle 153 on Enclosed Return Postal Card.

## Hydraulic Ladder

Holan Corporation has announced that the Series 2600-A Manual Hydraulic Ladder will replace the Series 2600 in the company's line of aerial ladders.



Holan Aerial Ladder

While retaining pushbutton control, several improved design features have been added, the maker reports. Support frame construction has been changed from tubular to plate metal for added rigidity. Skid-resistant pierced metal skid treads and re-location of the rotation crank to the left of the mast were changes made for added safety and ease of operation. A dual-level platform and 12,000-v. wood-strain insulators are standard equipment on the ladder. The unit is available in 28 and 32 ft. heights, rotates 360 deg. in either direction and elevates to a 75 deg. angle.

Holan Corporation, 4100 W. 150th St., Cleveland 35, Ohio.

For more details circle 154 on Enclosed Return Postal Card.

## Snap-Mount Backhoe

A new "Michigan Snap Mount" backhoe attachment for Models 55A, 75A and 85A tractor shovels is announced by the Construction Machinery Division of Clark Equipment Co.

The fully hydraulic backhoe can be snapped on or off a tractor shovel in less than a minute without tools, according to the Badger Division of The Warner & Swasey Co., the manufacturer. Other features include a 180 deg.



Snap-Mount Backhoe

continuous swing and 180 deg. bucket tilt. Also featured is a 12 ft. 4 in. digging depth, 10,000 lb. breakaway at the bucket teeth and 15 ft. 6 in. reach from the center rotation. A counterbalance is included for use when the hoe is disconnected. A variety of buckets designed specifically for the Michigan line of tractor shovels are also available.

Clark Equipment Co., Construction Machinery Division, Benton Harbor, Mich.

For more details circle 155 on Enclosed Return Postal Card.

## Filter Cartridges

A new method of packaging diesel fuel oil filter cartridges has been introduced by Wix Corporation.

Each cartridge is encased in a sturdy polyethylene envelope that is thermal sealed to prevent any contamination by dust or moisture, the maker states. The maker points out that another advantage gained by the clear packaging is that label identification is immediate and not hampered by wrapping.

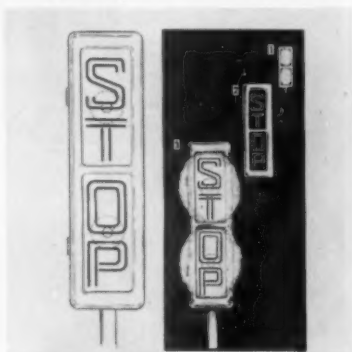
Wix Corporation, Gastonia, N. C.

For more details circle 156 on Enclosed Return Postal Card.

## Electronic Warning Signs

"Surgelites", a new line of warning lights, available from Electronic Lights, combine electronic flashing lights with neon letters.

The electronic flash tubes mounted in large reflectors flash on and off, emitting intense bursts of white light, while the neon letters spell out a continuous warning. These flash tubes can be seen flashing 900 percent sooner than con-



"Surgelites" Signs

ventional warning lights, even under adverse weather conditions, the producer states. The units can be manufactured to any specifications of size, message or number of flash tubes operating in any sequence. The power of the flash tube is rated 20MFD, capacity at approximately 900 v. This is equal to 8 watt seconds per flash. At this power these tubes are reported to have a life of many millions of flashes.

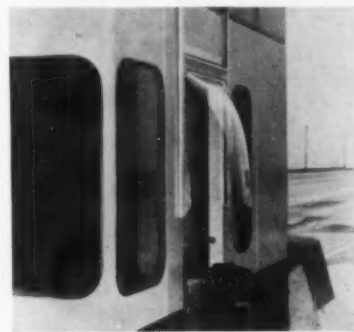
Electronic Lights, 1713 N. Ashland Avenue, Chicago 22, Ill.

For more details circle 157 on Enclosed Return Postal Card.

## Toll Booth Shield

A shaped Plexiglas shield to protect toll both operators and others during inclement weather is available from the Industrial Metal Fabricating Company.

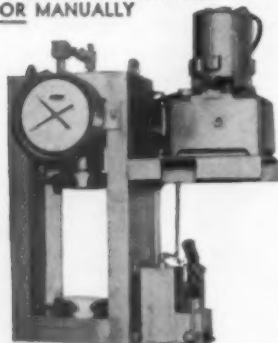
Transparent, outdoor durable, and shatter-resistant, the shield protects against rain, snow, sleet and cuts down the amount of heated air escaping from the booth. Available in a variety of sizes and shapes, the shield can be permanently installed, or mounted in a sheet metal framework allowing it to



Plexiglas Booth

## FORNEY JOB-SITE CONCRETE TESTER FT 20-E

- CONFORMS TO ASTM STANDARDS
- OPERATES ELECTRICALLY OR MANUALLY



- PERMANENTLY MOUNTED ELECTRIC PUMP
- 250,000 LB. LOAD RATING FOR CYLINDERS, CORES, BLOCKS, BEAMS, CUBES, BRICK AND DRAIN TILES

**FORNEY'S, INC.**  
TESTER DIVISION • BOX 310  
NEW CASTLE, PA., U. S. A.

... for more details circle 306  
on enclosed return postal card

The Man from Hobbs says:

MOVE THE BIG  
LOADS - ON OR OFF  
THE ROAD - WITH  
HOBBS FABRICATED  
SIDE RAIL  
FLOAT!



©© North Main • Fort Worth • Cable Hobbsco

... for more details circle 322 on enclosed return postal card

## New Products

be moved out of the doorway when not in use. The 5-lb. shield shown, which measures 32 in. by 36 in. overall, rides in a 16-gage aluminum sheet metal framework approximately twice its length.

**Rohm & Haas Company, Washing-  
ton Sq., Philadelphia 5, Pa.**

For more details circle 158 on  
Enclosed Return Postal Card.

### Transit

A new American made transit, constructed of brass and bronze with a steel center, has been announced by Warren-Knight Co.

The internal focusing, 24 power, erecting telescope can be plunged between standards like an engineer's transit for back sight, states the manu-



Warren-Knight Transit

facturer. The device has full vertical and horizontal circles. Both can be read to single minutes with double verniers. The clamp and tangent screws for both the center and the horizontal circles, as well as the telescope, are furnished complete with wide-frame tripod in a newly designed hardwood carrying case.

**Warren-Knight Co., 136 N. 12th St.,  
Philadelphia 7, Pa.**

For more details circle 159 on  
Enclosed Return Postal Card.

### Concrete Vibrator

Wacker Corp. announces production of a new internal concrete vibrator, Model HIV-1.

It operates only on 50 v. for safe handling on wet ground. High frequency, 180 cycle vibrator, squirrel cage motor-in-head operates at 10,000 vpm. load, even on high type concrete. There are no brushes or commutators.

**Wacker Corp., Hartford, Wisconsin**

For more details circle 160 on  
Enclosed Return Postal Card.

## Manufacturers' Literature

**SHOVEL CATALOG:** Manitowoc Engineering Corp., Manitowoc, Wis., has made available an 8-page catalog on the 1¼ yard Model 2000 Shovel which is also convertible to crane, dragline, and trench hoe applications. The booklet contains a number of photos used to illustrate the stable crawler base, the Manitowoc Power-Flo train, upper deck features, simple counterweight removal, and expedient shipment on trailers or rail.

For more details circle 161 on  
Enclosed Return Postal Card.

**LIFT-TRUCK ATTACHMENTS:** A standard fork lift truck can be changed to a front end loader with one of the lift-truck attachments described in a six-page catalog covering the complete shovel line by Allen Industrial Products, Inc., Menomonee Falls, Wis. Included in this catalog are hydraulic models which are operated from the truck's standard hydraulic system and the gravity dump shovel with pneumatic snubber action. Standard sizes range from 9 to 17 cu. ft. struck capacity for the hydraulic shovels and 11.5 to 21 cu. ft. for the gravity dump style, with special sizes available on order. Backing plates are adaptable for use with nearly any model lift truck.

For more details circle 162 on  
Enclosed Return Postal Card.

**PROJECTOR-PRINTER:** A new four-page bulletin, issued by Keuffel & Esser Co., Third and Adams Sts., Hoboken, N. J., describes an electrostatic system of making prints from 8½ by 11 to 34 by 48 in. from miniature negatives. This color bulletin, entitled "A 34 by 48-Inch Print in 40 Seconds", points out that Kecofax is the first machine to break the 24 in. print size barrier. The bulletin describes the operation as completely automatic, producing a finished print in 40 seconds. Adaptable to 35 mm, 70 mm and 105 mm negatives, the printer produces black line positives on white background.

For more details circle 163 on  
Enclosed Return Postal Card.

**POWER SHOVEL:** A new 12 page bulletin from the Thew Shovel Co. of Lorain, Ohio, covers the Thew-Lorain 47-ton model 820A which may be equipped as a 2 yd. shovel or as a crane, dragline, clamshell or hoe. Booklet gives details of design and construction of air controls and shear ball connection.

For more details circle 164 on  
Enclosed Return Postal Card.

## Manufacturers' Literature

**FINISHER-FLOAT BULLETIN:** A bulletin covering the Rex Combination finisher-float for concrete surface finishing has been announced by Chain Belt Co., Sales Promotion Dept., Milwaukee, Wisconsin. The bulletin, No. 60153, outlines why this unit produces surface results to meet state and federal specifications. It presents detailed descriptions and illustrations of such advantages as: frame adjustability; hydraulically-controlled, 16 in. rear metering screed; and 30 in. wide pan float for final finish that requires little hand finishing. The bulletin also describes the benefits of the unit's three crown features: quick crown-change device; single-point control; and quick crown-change cams which eliminate manual nut and bolt adjustment.

For more details circle 165 on  
Enclosed Return Postal Card.

**WELDING:** Reprints of an article on the welding of the newer metals and the problems that may be encountered are available from Air Reduction Sales Co., 150 E. 42nd St., New York 17, N. Y. Entitled "Which Welding Process for the New Metals," it is reprinted from the October, 1959 issue of Metalworking magazine. Author I. D. Holster offers a comprehensive review of the problems involved in joining the newer metals and alloys used in aircraft and missile design. The article also contains tabular presentation of process data on four of the newer metals.

For more details circle 166 on  
Enclosed Return Postal Card.

**PRESTRESSED CONCRETE:** A film explaining the principles and uses of prestressed concrete has been made available by Calaveras Cement Co., 315 Montgomery St., San Francisco, Calif. Narrated by Professor T. Y. Lin of the University of California, who is recognized as one of the world's foremost authorities on the subject, the film covers the history and future of this form of construction in addition to describing its present applications. The viewer is taken to construction jobs where prestressed concrete units are being installed, as well as into representative plants where huge concrete beams are formed on factory-like assembly lines.

For more details circle 167 on  
Enclosed Return Postal Card.

**TRACTOR SHOVELS:** A new bulletin describing the power, speed and handling characteristics of six "Michigan" line tractor shovels has been published by the Construction Machinery Division of Clark Equipment Co., Benton Harbor, Mich. Highlighting the avail-

ability of tractor shovels to match all specific industrial bulk materials handling, the publication is broken down into convenient reference sections. These include one section devoted to general specifications for each tractor shovel model, and others on the power train, the hydraulic system, the "bonus bucket" and overall engineering features.

Drawings, photographs and a table illustrate a discussion of the hydraulic system that emphasizes the hydraulic control of these six tractor shovels. A variety of job applications are featured, illustrating digging, carrying and dumping capabilities of the various tractor shovel models equipped with buckets ranging in size from 1 to 2¾ yd. capacity.

For more details circle 168 on  
Enclosed Return Postal Card.

**FLUORESCENT ENAMEL:** A new descriptive folder on Pyralux fluorescent enamel for safety and decorative paint of vehicles, aircraft and signs is now available. The four page publication, printed by DuPont Co., AP-63, Wilmington 98, Del., reproduces the actual fluorescent colors. Designs for identification of trucks and buses are shown, as well as a description of how the enamel serves its purpose. Directions for use are also included.

For more details circle 169 on  
Enclosed Return Postal Card.

**RECTIFIERS AND WELDERS:** Two new brochures, "Miller Gold Star Selenium Rectifiers" and "A Full Line of Fine Welders," are available from the Miller Electric Manufacturing Co., Appleton, Wis. Rectifiers are discussed in detail and characteristics in a 12 page brochure. Forty different models are listed, pictured and described.

For more details circle 170 on  
Enclosed Return Postal Card.

**CYLINDER CASTING:** Improper procedures employed in the casting of concrete cylinders will invariably produce low and erratic compressive strength. Approved concrete cylinder casting procedures including selection of molds; correct sample taking; and filling, handling and curing of cylinders are outlined in this publication. Prepared and distributed by the Master Builders Co., Cleveland, Ohio, this one page guide is printed on heavy paper for durability and is suitable for posting at job sites where testing is performed.

For more details circle 171 on  
Enclosed Return Postal Card.

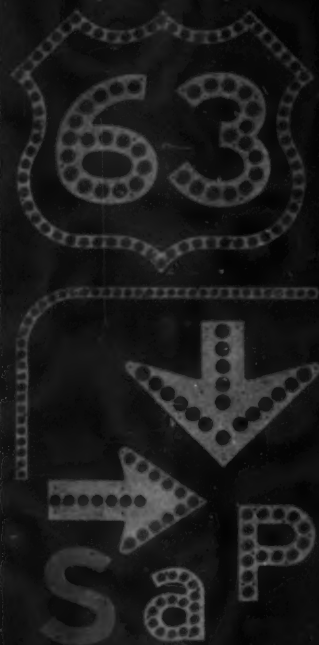
## YOU CAN MAKE

## SIGNS TO INTERSTATE STANDARDS

WITH **MIRO-FLEX**

INDIVIDUAL CUTOUT

- LETTERS
- ARROWS
- NUMERALS
- BORDERS
- CORNERS
- SHAPES



Make your own signs—with Miro-Flex pre-cut aluminum letters, figures, borders, and numerals. Available in wide variety of finishes with or without reflector buttons, reflective sheeting, beaded, plain enameled, or unfinished. Design recommended by AASHO and approved by U. S. Department of Commerce, Bureau of Public Roads. Send for free catalog!

WRITE PHONE WIRE

THE **MIRO-FLEX** CO., INC.

1824 EAST SECOND STREET  
WICHITA 14, KANSAS

... for more details circle 341 on enclosed return postal card





**BACKHOES AND CRANES:**

- 1—TL-26 Lorain Backhoe with 60' crane boom attachment complete with 3/4 yard clam shell bucket.
- 1—K-12 Insley Backhoe with 40' crane boom attachment.
- 1—Ottawa Backhoe mounted on Minneapolis-Moline rubber tired diesel tractor with front end loader attachment and Hydra Hammer combination tamper and breaker.

**MOTOR GRADERS AND HIGHLOADERS:**

- 1—No. 12 Cat. diesel powered Grader.
- 1—Allis-Chalmers Model "D" Motor Grader with Highloader attachment.
- 1—HD 5 A. C. diesel Highloader.

**AIR COMPRESSORS:**

- 2—Ingersoll-Rand No. 125 "Gyro-Flo" rotary portable air compressors complete with air tools and attachments.

**LOBOY TRAILER**

- 1—27 ton Martin R-4TL Tandem axle Loboy Trailer.

**MISCELLANEOUS EQUIPMENT**

- 1—1/2 sack Little Wonder Concrete mixer.
- 1—Trailer mounted centrifugal water ditch pump.
- 1—Clipper Masonry saw, electric.
- 1—New 1/2 yard Garbro concrete pouring bucket.
- 1—12"x24" prefab metal field Office building.

All equipment F.O.B. Joplin, Missouri.

**McCormick Const. Co.**

MAyfair 3-0521 Joplin, Missouri

BRAND NEW 25 to 27 Ton Crane, Factory built

**TANDEM LOWBOYS**

with long goose necks.

"Think of it"

PRICED FROM ONLY \$2,400 to \$2,975. LIST PRICE \$4,887.50

Compare the construction of this trailer and our price before you buy. Drop beds & beaver tails optional. Supply limited at prices quoted, as we purchased in large quantities last December.

New 27 & 35 Ton

**TANDEM LOWBOYS**

with hydraulic fold down goosenecks, drop beds with 1400 x 20 - 14 ply rubber. We have these priced at an extra special discount.

MAKE US OFFER

(9) '50 to '58 models 25 Ton

**TANDEM LOWBOYS**

Some like new. All makes, reasonable. Also a good variety of new and used TANDEM TILTBEDS. Reasonable.

WE CAN FINANCE YOU

Check our ad for trucks and trailers in Sunday's Minneapolis Tribune or Des Moines Register.

**PETERSON EQUIPMENT**

NEW ULM, MINN.

Elmwood 4-4178 - Elmwood 4-4179 for "Marvin Peterson personally" or Elmwood 4-4353, eves. & Sun.

**For Sale Bargain**

1958 Mack Tandem Model B425 with 12-yd. Dump Body, 21,500 miles.

**SPEER SAND & GRAVEL COMPANY**

Old Savannah Road  
AUGUSTA, GEORGIA  
P. O. Box 173 Tel. Park 2-6951

**BARGAINS**

**VALUES**

**ASPHALT PLANTS**

**AND ALLIED EQUIPMENT**

**FOR SALE**

**COMPLETE ASPHALT PLANTS**

- Barber-Greene PORTABLE—6000 lb. pugmill
- H & B PORTABLE—6000 lb. pugmill
- Cedar Rapids G-40 PORTABLE—4000 lb. pugmill
- Simplicity 50000 lb. pugmill w/70"x30' dryer
- Simplicity 5-80 and 5-100 plants—CHEAP
- H & B 5000 lb.—completely reconditioned
- Simplicity 2500 lb. pugmill—excellent
- Cedar Rapids FA PORTABLE—2500 lb. pugmill

**ALLIED EQUIPMENT**

- Cedar Rapids Asphalt Finisher—like new
- 3—Barber-Greene 879A Asphalt Finishers
- 7—Galion & Buffalo Springfield 8-12 ton 2 and 3 axle tandem & 3 wheel rollers
- Ulrich T-40 trench filler & stone spreader
- Etnyre 1070 & 1100 gal. distributors
- 3—Blaw Knox 85 & 95 Wideners - late models

Numerous other items including truck cranes, tractors, buckets, pumps, brooms, all types grading, concrete paving, hauling and allied type equipment. All equipment excellent shape and ready to go to work, prices on request!

WRITE — WIRE — CALL

**The AL J. GOODMAN & Sons Co.**

P. O. Box 3237, Forest Pk. Sta.  
LITTLE ROCK, ARKANSAS

P. O. Box 363  
ASHEVILLE, N. C.

**8000 CANDLEPOWER**

**CARBIDE FLOOD LIGHTS • COSTS LITTLE TO OPERATE • GENERATES OWN GAS**

Portable Illumination—Where and When You Need It

- MARINAS • AIRFIELDS • BALLFIELDS
- RESCUE WORK • SALVAGE WORK

Operates in hot, also freezing weather, rain, sleet, hail, wind. 13" dia. reflector—sturdy welded const. Heavily galvanized. Free of smoke and sparks. 2 designs to choose from.

Carbide Floodlight Round Tank, 100 lb. drum g20 carbide cake contains 40 cakes—cost \$9.10 cwt. 1 cake with water keeps light burning approx. 3 hours.  
Millburn Floodlight Square Tank. 4 carbide cakes with water will burn approx. 12 hours—\$9.10 cwt. Carbide cakes can be purchased locally.

**J. JACOB SHANNON**

218 N. 22nd St., Philadelphia 3, Pa.  
Expressway to 23r St. Exit Direct—No City Traffic

**1250**  
EA.

EXP.  
CHG.  
COLL.



**FOR SALE**

- 1 Barber-Greene Finishing Machine 1952 Model.....\$5500.00
- 1 13 cubic feet Bitumen Mixer Jaeger.....100.00
- 1 7 cubic feet Kwik Mix with Motor.....200.00
- 1 P & H Crane—Model 255A—3/4 yard 40' Boom.....5500.00
- 1 Dipper Stick for P & H #255 3/4 yard.....500.00
- 1 Dipper Stick for Lima 3/4 yard.....500.00
- 1 Chip Spreader Good Roads.....200.00
- 1 8' Miller Spreader #80 Asphalt.....600.00

**RITCHIE BROTHERS CONSTRUCTION COMPANY**

P.O. Box 2365, Wichita 14, Kansas

## ATT'N. JAEGER MIXER FLEET OWNERS

USED MIXERS - WHOLESALE - NO TRADES - TERMS

Size	S.N.	Truck	Aux.	Mixer End	Water Tank	Sale Price
5 Yd.	J11996	.....		Open	75 Gal.	\$1100.
5 Yd.	J11751	I-H 190	2 Sp.	Open	Large	\$4250.
5 Yd.	J10967	.....		Seal	Large	\$1000.
3½ Yd.	J11242	I-H KB6	2 Sp.	Seal	110 Gal.	\$2150.
5 Yd.	J108677	.....		Seal	Large	\$1050.
5 Yd.	J6503	Federal	3 Sp.	Seal	Large	\$1400.

Cleaned - Sand Blasted - Painted - Checked Over - Terms.

## EIGHMY EQUIPMENT COMPANY

Pierpont at W. State St.

ROCKFORD, ILLINOIS

WO 4-6706

## — FOR SALE —

### CRUSHING PLANT UNITS

All New in 1955 for St. Lawrence Seaway Contract  
by Canit Construction in Beauharnois, P. Q.

- 1—Symons 5½' course bowl crusher with 150 HP motor.
- 1—Symons 4' ¾" sand crusher with 150 HP motor.
- 1—Symons 4' ¾" sand crusher with 150 HP motor.
- 4—Ty-Rock 5' by 14' single deck screens with 15 HP motors.
- 3—Jeffrey 24" by 96" electric vibrating feeders.
- 5—Feeder conveyors, 24" & 30" wide, 105' to 70' long complete with belts & Motors.
- 1—Stacker conveyor, 24" wide, 210' long, complete with belt & motor.
- 1—Unloading station, complete with hoppers, gates and chutes.

## CANIT-JANIN JOINT VENTURE

940 Cote de Liesse - Montreal, P. Q.

## 10 TANDEM WHITES

1957 Models with aluminum wheels, 84 in. CA will fit 12 ft. dump  
or 6 yd. mixer, presently equipped as tractors.

Also 2 - 1954 tandem Hendricksons.

## DUNCAN BROS., Piedmont, Missouri

## FOR SALE POWER SHOVELS

¾ cy. P&H Crane.....	\$ 4,750.00
½ cy. Bay City #30.....	7,500.00
¾ cy. Hanson.....	3,500.00
¾ Northwest 104.....	2,500.00
1 cy. General Hoe.....	12,000.00

## W. C. Bye, Inc.

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  - 1—Ottawa Hydrahammer
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Located Burlington, North Carolina—Excellent condition. ....\$16,000.00
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- 1 Caterpillar Motor Grader, Model 12, Serial 87-7291, power steering, complete with scarifier, motor recently overhauled, condition good ..... \$8,500.00
- 1 Adams Motor Grader, Model 610, Serial #1543, power steering complete with scarifier, condition good ..... \$7,500.00
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- 1 Roto-Tiller Pulvi-Mixer, powered by Waukesha engine, Model 6MZR, condition fair, ..... \$1,250.00
- 1 International Tractor, Model I-9, Serial 26578 with Trojan hydraulic dozer, Model BD72, condition good ..... \$1,750.00
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- 2 Let. Westinghouse Rear Dump Rockers, Model C, G.M.C. Diesel powered.
- 2 Let. Westinghouse Rear Dump Rockers, Model B.
- 1 Manitowoc shovel, model 3500, Caterpillar engine, Kohler Light plant, 2 yd. bucket.
- 1 Lima Shovel, Model 1601, Cummins Diesel Engine, Kohler Light Plant, 4 yd. Bucket, Torque Converter, 1600 hours.
- 2 Lima 34 Paymasters, One W/shovel Front Buda Gas Engine, one W/Crane Boom, G.M.C. Diesel Engine.
- 1 Linkbelt shovel, Model K360, Caterpillar Engine, Hydraulic Controls, 1 1/2 yd. Anso bucket.
- 1 Schram Trac-Air Self Propelled Air Compressor, Model SU4.
- 2 Gardner-Denver 600 Rotary Air Compressors, G.M.C. Diesel Engines.
- 1 Gardner-Denver 125 Air Compressor, Hercules Engine.
- 5 Light Plants, 2 Kohler, 2 Leroy, 1 Hercules.
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- 1 Damco Self Propelled Blastholer Hercules Diesel Eng. Gardner-Denver Compressor.
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- 1 Buffalo Springfield Tandem Roller, 20 ton, Hercules Gas Engine, Vibratory Roll Attach. W/Hercules Engine.
- 1 Buffalo Springfield Kompactor, 16 ton, 4 wheel, Caterpillar Engine.
- 1 Gradall, GMC Diesel Engine, 36" & 60" Buckets, single Tooth Ripper. 800 hours.
- 1 Aspc P-120 Paver.
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- 1 Little Ford Sweeper.
- 5 Sheepfoot Rollers 48" to 60".
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- 5 Water Pumps 1/2" to 6".
- 3 Silent Blow Heaters
- 1 Steam Cleaner
- 3 3/4 yd Dragline Buckets
- 2 Portable Concrete Batch Plants Complete

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- 7000' Rex three-way forms 19"x21"x24"
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  - (2) 34-E Worthington Pavers
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  - (2) Triple Deck Lippman Vibrating Screens
  - (2) Falck 36 H.P. Concrete Saws
  - (2) Clipper 36 H.P. Concrete Saws
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  - (25) 1957 International (4) batch trucks

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- (1) Shovel Front for N.W. 80-D, Attachments only.

Trailers—Low-Boys Any Size up to 60, ten. Send pictures, price first. 3 axle type, too.

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Iron Mountain, Mich.

3-18' x 78' Dryers—3654 Jaw Crusher  
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Feeder 180' Long. 48" x 120' Feeder  
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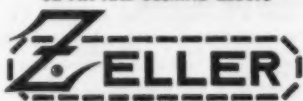


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3 - SMITH 6 yd. Deluxe Chain Drive Truck Mixers. 1955 Model, w/6-cyl. Chrysler Engine, 65 gal. water tanks. Mounted on T800 Ford Trucks. With power steering. 900x20 Nylon tires. Good operating condition. ....\$5,500.00  
Each .....\$5,500.00  
2 - SMITH 6 yd. Deluxe Chain Drive Truck Mixers. 1955 Model, as above. Mounted on RF192 International Trucks. One with 34M Tandem .....\$6,500.00  
One with 28M Tandem .....\$6,000.00

### COMPRESSORS - DRILLS - HOISTS - MISC.

JOY RP600 Rotary Portable Air Compressor on 4 pneu. tires, w/GM6055 Diesel Engine. ....\$16,500.00  
JOY RP665 Rotary Portable Air Compressor on 4 pneu. tires, w/GM4055 Diesel engine. ....\$12,750.00  
JOY WK80-210 Portable Air Compressor on 4 pneu. tires, w/K428 Buda Gasoline Engine. ....\$3,450.00  
9 - JOY WK80-75 Portable Air Compressors on 2 pneu. tires, w/F-140 Continental Engine. ....\$1,850.00 to \$2,950.00  
WORTHINGTON 315 CFM Portable Air Compressor on 4 pneu. tires. W/UD18A International Diesel Engine .....\$5,950.00  
JAEGER 210 CFM Portable Compressor, Serial #C157B. W/D4600 Cat Engine. On 4 pneu. tires. Excellent .....\$4,500.00  
6 - JOY LWB-8 Wagon Drills w/TM350 Drills, on 3 pneu. tired light weight wagon - rebuilt. ....\$1,500.00 to \$1,750.00  
JOY TM400 Drill - MW12 Feed. Mounted on 8N Ford Tractor w/Hyd. Controls .....\$4,500.00  
JOY TM400B Drill - MW14 Feed (new). Mounted on 8N Ford Tractor w/Hydraulic Controls .....\$4,000.00  
AUSTIN WESTERN Model 99M 4-wheel Drive Grader, Serial #M5090, w/UD4 International Engine (rebuilt), Hydraulic Controls, Scarifier; New 1400x20 tires .....\$3,600.00  
3 - ESSICK VR-54-TEC Vibrating Roller, Tow-Type, with Continental Gasoline Engine, Electric Starting. Ea. ....\$3,250.00  
(Can be used as TRIPLEX UNIT with gang hook-up) .....\$9,000.00  
3 - YEABE HARDSOCC Vertical Auger Drills w/TF12HP Wisconsin Engines, on 3 pneu. tires. Ea. ....\$1,250.00  
CHGE - 23AD Double Drum Hoist with V4 Wisconsin Engine, 3000# capacity, \$1,150.00 (Can be equipped as 20HP - Electric)  
CHGE - 26AD Double Drum Hoist w/D201 45-HP LeRoi Gasoline Engine, 4500# capacity - Completely rebuilt .....\$2,650.00  
HAYWARD 15 cu. ft. Std. - 4-Blad Orange Peel Bucket. Good condition .....\$1,075.00

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KANSAS CITY, MISSOURI

## FACTORY TRADE-INS

CRANES — SHOVELS — HOES — DRAGLINES

- 5½ yd. LIMA 2400 SHOVEL. Good 1953 Model. Many Extras. Located Pennsylvania #32932  
 3 yd. P&H 1055 SHOVEL. Good 1946 model, extra features. Located Illinois. #10475  
 ¾ yd. MARION 35-M DRAG-CLAM. Excellent 1958 model with extras. Located Ark. #21939  
 ¾ yd. MARION 32-M DRAGLINE. Good 1955 model, gas powered. Located Ohio. #21369  
 ¾ yd. MARION 35-M SHOVEL. Excellent 1957 model, good price. Located Kansas. #21731  
 2½ yd. P&H 855 DRAGLINE. Good 1946 model, 75 ft. boom, extras. Located Penna. #7957  
 2½ yd. P&H 955-A SHOVEL. Good 1951 model, extra engine. Located Arizona. #14944  
 4 yd. MANITOWOC 4500 SHOVEL. Good 1955 model, 60 ft. boom. Located Ohio. #4631  
 2½ yd. LIMA 1201 SHOVEL. Average 1955 model, hi-gantry. Located Ohio. #329019  
 3½ yd. LIMA 1201 DRAGLINE. Good 1955 model, 100 ft. boom. Located Louisiana. #329027  
 1 yd. MARION 43-M DRAG-CLAM. Good 1952 model, 60 ft. boom. Located Indiana. #9605  
 1 yd. MARION 43-M DRAG-CLAM. Good 1951 model, 60 ft. boom. Located Indiana. #9426  
 ¾ yd. MARION 32-M. Good 1956 model, no front end. Located Maryland. #21606  
 4 yd. MARION 111-M DRAGLINE. Excellent 1958 model, 5 yd. Bucket, 80 ft. boom. Located Pennsylvania. #22010  
 1½ yd. MARION 362 SHOVEL. Good 1953 model, 23 ft. boom. Located Indiana. #9892  
 1 yd. MARION 43-M SHOVEL. Good 1956 model, Cat engine. Ohio. #21456  
 1½ yd. MARION 362 DRAGLINE. Excellent 1959 model, 2 yd. Bucket, 60 ft. boom. Located Florida. #22107.  
 ¾ yd. NORTHWEST 25 SHOVEL. Good 1948 model, gas power. Located New York. #11643

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## Good Used Equipment PRICED TO SELL

- 1—Allis-Chalmers Model HD11  
equipped w/8 ft. Inside Dozer & Model  
F Carco Winch, New Rolls, Rollers,  
Rebuilt Idlers. Tractor Perfect. Cleaned  
and Painted.  
FOB Mt. Vernon, Ill. ....\$15,500  
 1—Allis-Chalmers Model 16AC  
with Torque Converter and Hydraulic  
dozer. Tractor in Good Condition.  
Cleaned and Painted.  
FOB Mt. Vernon, Ill. ....\$17,500  
 1—Allis-Chalmers Model HD9B  
with Hydraulic Dozer, New Rolls,  
Sprockets, Rollers, Rebuilt Idlers. Ex-  
cellent Condition Throughout. Cleaned  
and Painted.  
FOB Sikeston, Mo. ....\$10,000

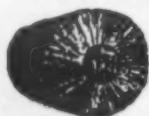
- 1—Allis-Chalmers Model HD11  
equipped w/8 ft. Inside Dozer, Model  
R Carco Winch, & Headache. Tractor  
in Good Condition Throughout. Cleaned  
and Painted.  
FOB Mt. Vernon, Ill. ....\$12,500  
 1—D6, S/N 9U3492  
equipped with Inside Blade & Winch.  
Tractor in Excellent Condition. Has  
complete new under-carriage. Cleaned  
and Painted.  
FOB Mt. Vernon, Ill. ....\$10,300  
 1—International Model TD14  
equipped with B-E Hydraulic Angle  
Dozer. Tractor in Good Condition  
Throughout.  
FOB Sikeston, Mo. ....\$6,000

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Brushes for Every Industrial Need

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N. S. VanDeventer, Owner

## For Sale By Owner

- 1—D8 Caterpillar Tractor with Dozer and L.P.  
Scoop - 2 U Series.  
1—D6 Caterpillar Tractor with Hydraulic Dozer  
2—P&H 255 Combination Cranes, Shovel and  
Dragline  
1—Rogers Jaw Crusher 15x24.

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## ATTENTION EARTH MOVERS

5—Used Euclid TS-24 twin engine scrapers (24  
yd.), powered by GM diesel engines, late  
1957 machines.

1—Used TD-24 Int'l tractor with pusher block  
—very good condition.

4—Used Euclid 14 TDT scrapers with 215H  
(15.5 cu. yd.) Bowls, powered by Cum-  
mins NHS diesel engines, 10 speed trans-  
missions. (1955 Mach.)

5—Used Euclid 13 yd. Bottom dumps. Exc.  
Cond. Mod. 71 FDT and Mod. 38 FDT  
with GM 6-71 engines.

5—Used 1955 Model TS-360 Allis-Chalmers  
rubber-tired scrapers, 15 yd. struck  
capacity.

2—Used Mod. 5-18 Euclid scrapers (18 yd.)  
1957 machines, powered by GM-110 diesel  
engines, located Phoenix, Arizona.

3—Used Mod. 5-7 Euclid scrapers (7 yd)  
powered by GM 4-71 diesel engines.

14—Used Mod. 5-18 Euclid scrapers (18 yd.)  
powered by GM-6-110 diesel engines (all  
1957 and 1958 machines).

2—Used TS-300 Allis-Chalmers rubber tired  
scrapers, 14 yd. struck cap. Good cond.,  
1955 machs.

1—Slightly used Euclid Twin Tractor TC12.  
Latest 8-track roller frame, with dozer and  
double drum control.

2—Used Model CR LeTourneau 12 yd. scrapers  
(1949). Cummins diesel engine powered.  
Exc. condition.

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 1 1956 Single axle 10 yd. Omaha  
Standard Center Dump  
 1 1957 Single axle 10 yd. Fruehauf  
Center Dump  
 1 1958 Tandem axle 40' Fruehauf  
flat with removable grain sides  
 1 1949 Tandem Axle 32' Fruehauf  
Van

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Glen Wintersteen  
or  
Roy F. Drake

**EUCLID TWIN ENGINE MOTOR SCRAPER**, 18 Cy. Struck (24 cy. Heaped) Scrapers. Tractor model 68FDT with 17SH Scraper, two GM 200 HP engines. Torque Converters. Reconditioned. Consider Rental with Purchase Option, \$18,000.

**BUCCYRUS-ERIE** 388 Crane, Dragline, C/jam. #45979, w/long & wide tracks, GM671 diesel, very good. \$23,500.

**KOEHRING 304 MOTORCRANE**, 20-25 ton, #7722, Gov's surplus, new 1952, used 215 hrs. like new. \$19,500 yard. Rent \$1500/mo. applicable purchase.

**LORAIN MC3 Motorcrane**, 15 ton capacity, tandem, rebuilt. \$9,750. Rent \$650/mo. apply on purchase.

**LORAIN L41 Shovel**, 3/4 cy, Cat. D318 diesel, good. \$5,000 Yard.

**SHOVEL ATTACHMENTS**. P&H 655B, new & complete. \$4,500. Lima 34, new, \$1,000. Orton 2 cy. New. Fit others new. \$1,500 Yard.

**QUICKWAY 125A Truck Backhoe**, 6/10 cy. new 1956, excellent on 4-ton tandem carrier. \$6,750 Yard.

**QUICKWAY L Truck Backhoe**, 4/10 cy. new 1951, very good, on 4-ton tandem carrier. \$3,750 Yard.

**CEDARAPIDS 2036 Jaw Portable w/3x8 apron feeder, conveyor, diesel power, mounted tandem axles, rebuilt completely, Excellent. \$18,000 Terms.**

**UNIVERSAL 293Q Portable Crushing & Screening Plant w/1824 rb. Jaw, Apron feeder. 24x16 & 24x14 Double Roll Crusher, 3x10 2-1/2 deck screen, rotovator, Cat. diesel, tandem rubber. Late model, excellent, 1/3 price. \$18,000. Maryland. Terms.**

**CEDARAPIDS Rock-It Portable Plant**, 75-100 tph, w/2225 Jaw, feeder, 3033 hammermill, 4x10 2-deck screen rotovator, twin 671 GM diesel, tandem rubber. Very good. \$29,500.

**CEDARAPIDS 2A Portable Secondary Plant w/1624 rolls, 3x10 2-deck screen, rotovator, 2-delivery conveyors, power tandem rubber, in gov't storage, like new. \$10,500 Yard.**

**CEDARAPIDS Pitmaster Portable Plant w/1016 Jaw feeder, 1616 rolls, 3x8 screen, rotovator, pneumatic tires. Good. \$11,000. Yard. Rental purchase.**

**CEDARAPIDS 1036 Jaw Crusher roller brg.**, #10812, good. \$3,250.

## WENZEL MACHINERY COMPANY

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## FOR SALE

1 Model 95 Northwest Dragline Serial No. 17348, equipped with 60' boom 38" x 17.5" crawlers, Murphy Diesel engine, machine reconditioned - 5 years old - good condition.

## ANDERSON EQUIPMENT CO., INC.

Merchants National Bldg.  
Omaha 2, Nebraska  
Telephone: HARney 2533

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D-9 Dozer w/Atco Ripper  
DW21s - 26 1/2 cy.  
75 ton SW Roller  
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## NEW! 18:00 x 24 Ground Grip 20-Ply Earthmover Tires

1st. Line. Fresh Rubber, Perfect, No Weather Cracks. Complete with Flap.. **\$395**

18:00 x 24, 16-ply Low profile, good used **\$100**

16:00 x 25, 20-Ply Non-directional, good used **\$95**

14:00 x 24, 16-Ply Unused take-offs **\$95**

14:00 x 20, 12-Ply Non-directional, good used **\$65**

13:50 x 20 Conventional, unused **\$65**

13:00 x 24, 8-Ply Grader Tires, good used **\$45**

Dealer's Inquiries Invited

## SAM WINER MOTORS, Inc.

Dept. R5, 3417 E. Waterloo Rd.  
Akron, Ohio MA 8-2641

Write for Money-Saving Catalogs

## DIESEL TRACTORS

10—1955 & 1955 R.D. 205 Internationals with J. T. Cummins Engines with Tag Axles.

4—1954 R.F. 195 Tandems 175" wheel base with 8 to 10 yard dump bodies.

5—1956 F900 Fords with Tag Axle and 8 to 10 yard Anthony dump bodies.

## A. J. RHIAN

International Truck Dealer  
Phone NO 5-2527  
YANKTON, SOUTH DAKOTA

## FOR SALE OR LEASE

Lorain Model 820 Dragline, S/N 18047 - equipped with 65' boom, D13000 engine, 2 yard bucket .. \$24,000.00  
15B B.E. Dragline with Backhoe Attachment ..... 11,500.00  
TL25 Lorain Dragline with Backhoe Attachment ..... 14,000.00  
35M Marion Dragline with Backhoe Attachment ..... 24,000.00  
No. 6 Northwest Dragline with 1 3/4 yard bucket ..... 12,500.00  
HD-6G Allis-Chalmers Front End Loader ..... 7,500.00  
HD-9G Allis-Chalmers Front End Loader ..... 10,000.00  
HD-9 Allis-Chalmers Straight Cable Dozer ..... 7,500.00

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## For Sale

New Bulk Cement Trailers

1—Gravity 1—Auger

Designed for 50' O.A.L. & 73,280 G.V.W.

Call or write — Bill Becker

## Dan Dugan Oil Transport Co.

Sioux Falls, South Dakota  
Phone ED 4-6011

## DRAGLINE MATS

Any Length, Width or Built to Specifications

We build them a little better for a little less.

STRICTLY HARDWOOD.

Also LUMBER and PILING

## Kent Piling Co., Inc.

CHARLES KENT, PRESIDENT  
Phone Days: Amite 2641 - 2644 - Night 8454  
FLUKER, LOUISIANA



# Manufacturers' Literature

Continued from page 194

**MOTO-LOADER:** A new 16-page bulletin has been released covering the Lorain Moto-Loader Model ML-157 with 7,000 lb. carrying capacity. This booklet, published by Thew Shovel Co., Lorain, Ohio, explains the machine's balance of weight, power and control. The loader may use 1½ to 3 yard buckets depending on the material to be lifted and may be equipped with such attachments as crane hooks, backfiller blades, fork lift, backhoe, side boom, log grapple or snow plow.

For more details circle 175 on Enclosed Return Postal Card.

**HYDRAULIC MOWERS:** Designed for highway and industrial use, these tractor-mounted mowers are described in a new four-page bulletin released by A. C. Anderson, Inc., Wildwood, N. J. The mowers feature positive, adjustable knife speed, independent of tractor speed, instant change of cutting height to 15 in. or a cutting angle from -45 deg. to +90 deg. Other features described in the bulletin are reversible motor for freeing jam-ups, a heavy duty breakaway with rapid re-engagement, and quick, safe knife changing. The bulletin also describes the Anderson extension mower for mowing over guard rails and at heights to 116 in., as well as Model F contour Glide Mowers for mower and front end loader combinations.

For more details circle 176 on Enclosed Return Postal Card.

**ARC WELDERS:** Four "Sureweld" utility arc welders, for use where both AC and DC welding currents are needed, are described in two new bulletins available from National Cylinder Gas Division of Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill. Models SU-185 and SU-185P are illustrated and described in bulletin NH-176. These welders are designed for use in shops and garages. Optional equipment is also shown. Bulletin NH-177 presents models SU-255 and SU-255P which are discussed, covering features specifications and optional equipment.

For more details circle 177 on Enclosed Return Postal Card.

**BONDING CONCRETE:** A 32 page Handbook of Application Methods is available from the International Epoxy Corp., 501 N.E. 33rd St., Ft. Lauderdale, Fla. It details field tested application methods for bonding concrete-surface preparation, equipment re-

quired, mixing procedures, curing and use of solvents in the adhesives. It covers pertinent facts and figures for use in repair and maintenance of highways, buildings, bridges, airports, dams and drives. Also included is a table of the effect of temperature on curing time.

For more details circle 178 on Enclosed Return Postal Card.

**ROLLERS:** The Rolcor Div. of Rosco Mfg. Co., Minneapolis 6, Minn., has published a bulletin featuring its entire line of vibratory and static type rollers. Many photos illustrate the various uses of the four units described. Included are a one and a two ton static roller, a two ton vibrating roller and a tow-type vibrating unit. A trailer for transporting rollers is also shown.

For more details circle 179 on Enclosed Return Postal Card.

**POWER STEERING:** A new line of production-built power steering components that can be combined to suit many steering axle load requirements is described in a new brochure released by Vickers, Inc., Detroit 32, Mich. The brochure includes component selection tables, performance curves, and typical examples for determining the proper size steering components to meet various turning speed and steered axle load requirements.

For more details circle 180 on Enclosed Return Postal Card.

**AIR COMPRESSORS:** Now available from Atlas Copco, 545 Fifth Ave., New York 17, New York, is a four-page folder describing the "Twin-Air" rotary screw type air compressors which will deliver from 6,900 to 19,400 cu. ft. of air per minute at 110 psi. The folder includes a discussion of the machine's compression principle, design features, operational advantages and machine dimensions.

For more details circle 181 on Enclosed Return Postal Card.

**MOTOR SCRAPER:** A new four page brochure by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., briefly describes the operating features of the recently introduced, 30 cu. yd. TS-360 motor scraper. The literature points out the advantages of the scraper's all-hydraulic operation and its Kon-Tork differential.

For more details circle 182 on Enclosed Return Postal Card.

**BATCHING HANDBOOK:** A comprehensive Automatic Batching Handbook has recently been published by the Howe Scale Co., Rutland, Vermont. Outlining the advantages of automatic batching, this ten page brochure describes the procedures and equipment designed specifically for economical automatic batching. Pictured are controls and indicators or recorders commonly used. A fold-out section enables the reader to plan a simple automatic batching system for his needs.

For more details circle 183 on Enclosed Return Postal Card.

**CATERPILLAR TRACTORS:** Production and mechanical advantages of the new Caterpillar D7, D6 and D4 tractors are discussed in "The Profit Side of Your Ledger", an eight-page booklet by Caterpillar Tractor Co., Peoria, Illinois. Operation, production and dependability of these machines is discussed. The mechanical features covered are diesel engines, dry-type air cleaners, lifetime lubricated undercarriages and an oil clutch.

For more details circle 184 on Enclosed Return Postal Card.

**VIBRATOR:** A bulletin describing a new vibrator is available from Dart Mfg. Co., 1002 S. Jason Street, Denver, Colo. Operable out of concrete without a special cooling technique, this device may be operated without the use of fuses or a terminal breaker. The problem of depth has been eliminated with the use of wireloaded plug-in extensions, which come in lengths of ten ft.

For more details circle 185 on Enclosed Return Postal Card.

**AGGREGATE SERVICES:** A two-color brochure, released by Cindaco Inc., 127 E. Second St., Dayton 2, Ohio, describes their services and equipment for the aggregate industry. These services include research, engineering and design of complete processing plants for aggregates, concrete and asphalt. The company offers custom design machinery for feeding, conveying, screening, crushing, washing and classification. Special sub-services are also available for pumping and water conservation, and automation controls for improving quality control.

For more details circle 186 on Enclosed Return Postal Card.



**WHEEL DOLLY:** A portable wheel dolly for buses, trucks or tractors, which permits one-man removal and replacement of any dual wheel combination from 6.50 to 12.00 is described and illustrated in a bulletin issued by Alexander-Tagg Industries, Inc., Hatboro, Pa. Easily stored or carried, it weighs 46 lbs., has a rated capacity of 2,000 lb. and a 40 in. ball bearing trolley travel. Also described is a lighter weight swivel caster dolly for use on hard surfaces, and an adapter kit.

For more details circle 187 on  
Enclosed Return Postal Card.

**WATERSTOP:** Polyvinylchloride waterstops, manufactured by Waljohn Waterstop, Inc., 8727 Fourth Ave., Brooklyn 9, N. Y., are illustrated in a brochure recently published. Listed in the brochure are the advantages, application and installation instructions, along with a series of charts of results from various testing companies. A profile sheet of different sizes and types available is included.

For more details circle 188 on  
Enclosed Return Postal Card.

**ASPHALT PAVING BOOKLETS:** Helpful information on the methods and materials employed in heavy-duty, intermediate and low-cost types of asphalt construction is supplied in two booklets, obtainable from Texaco, Inc., Asphalt Sales Div., 135 E. 42nd St., New York 17, N.Y. Plant-mixed pavements, asphalt pavements, asphalt penetration macadam, road-mixed asphalt surfaces and bituminous surface-treatment are covered in the literature.

For more details circle 189 on  
Enclosed Return Postal Card.

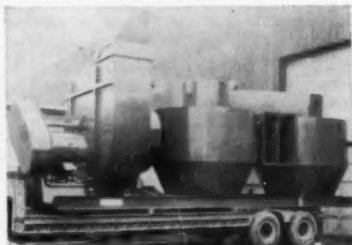
**DITCHER:** A four page brochure from Barber-Greene, Aurora, Ill. describes and pictures several wheel ditchers that will dig up to seven foot depths. Equipped with Hydra-Crowd transmission, these machines have automatic overload guards, hydraulic brakes and a hydraulic wheel hoist.

For more details circle 190 on  
Enclosed Return Postal Card.

**TEST REPORT:** Euclid Div. of General Motors, Cleveland 17, Ohio, has published a 24 page report on a year-long demonstration of Model C-6 tractors in the Pacific Northwest. Illustrated, with working views, the booklet describes the types of operations where this 211 net h.p. tractor was used by loggers and road contractors.

For more details circle 191 on  
Enclosed Return Postal Card.

## With The Manufacturers'



A TWIN CYCLONE dust collector, the first major asphalt plant component to be built by Standard Steel Corp. at its new eastern manufacturing plant at Lowell, Mass., has been shipped to a New England paving contractor, Granite State Asphalt Products Co. Standard Steel acquired its manufacturing facility at Lowell in the summer of 1959.

SOILTEST, INC. has as its new eastern sales manager James J. Steur. Steur has served as the company's marketing director since September 1958. He will continue as marketing director in addition to his new duties.

THE TIMKEN ROLLER BEARING COMPANY announced that Henry A. Tobey has been elected vice president in charge of manufacturing for the Bearing and Rock Bit Division. Tobey will take the place of H. M. Richey, who retired December 1st, 1959.

CHALLENGE MANUFACTURING COMPANY AND COOK BROTHERS EQUIPMENT Co. have merged into one corporate group to be known as Challenge-Cook Bros. Challenge is the manufacturer of the Pacemaker Truck Mixer, and Cook Bros. manufacturers of heavy duty trucks and truck equipment.

THE APPOINTMENT OF Thomas J. McNeil as New York dist. manager for the Eimco Tractor Div. has been announced by that Corporation. McNeil joined the Eimco organization in 1959 and was in market development work before assuming his present position.

R. W. KLING has been appointed Chief Engineer of American-Marietta's Construction Equipment Div., Milwaukee. Kling joins the firms with a strong background in the heavy construction field, formerly serving as vice-president of Engineering for the Athey Products Corp.

THE CINCINNATI BRANCH of Yale Materials Handling Division, The Yale & Town Manufacturing Co. has been purchased by the newly-formed Moon Equipment Co., according to a joint announcement by representatives of both companies.

JAMES L. WOODLEY, recently manager of Hyster Co., Danville, Illinois, has been placed in charge of company-wide manufacturing activities. The appointment will bring him to the company's general administrative office in Portland, Ore.

BARBER-GREENE Co., Aurora, Illinois, and Smith Engineering Works, Milwaukee, Wis., have announced the approval of a proposed merger. The two companies have been closely associated for many years. Their products are closely allied and are frequently found in the same installations. The merged company will operate under the name of Barber-Greene Co.

THE APPOINTMENT OF Jetty J. Kriva as manager of its current engineering department has been announced by the construction machinery section of Chain Belt Co., Milwaukee. Former manager of general standardization at the company, Kriva will be responsible for the direction of the construction machinery section's current engineering function and policies in his new position.

COURSES ON CRAWLER tractors, rear dump trucks and overhung scrapers are being offered by the Service Dept. of Euclid Division of General Motors at the school in Cleveland, Ohio. Euclid service training combines classroom lectures and actual step-by-step component teardown to instruct students on preventive maintenance, overhaul and repair.

R. E. BROOKS, 77, a pioneer in establishing the packaged boiler industry, died recently in Milwaukee. He teamed with J. C. Cleaver during 1931 in founding the Cleaver-Brooks Co., leading manufacturer of packaged boilers. His most significant contributions were in the areas of sales and distribution and company management. Under his direction the firm operations expanded to include plants in many cities including Milwaukee, Wis.

# With the Manufacturers'

THE APPOINTMENT of Joseph A. Wiendle as general manager of sales for Ingersoll-Rand Co. has been announced by Robert H. Johnson, Chairman of the company. A professional engineer, Mr. Wiendle was previously assistant general sales manager.

JACK A. CHANTREY was elected treasurer of Bucyrus-Erie Co., South Milwaukee, Wis. He succeeds V. C. Studley, who continues as vice president in charge of finance. All other officers were re-elected, the company announced.

AMERICAN-MARIETTA announced the election of John W. Spoor to a vice presidency. Since 1957 Mr. Spoor has been associated with A-M's Construction Equipment Div. at Milwaukee and its Seaman-Andwall Corp. subsidiary at Ixonia, Wis.

PERCY H. BATTEN, founder and chairman of the board of Twin Disc Clutch Co., died April 8 at Racine, Wis. During his 42 year career at Twin Disc, Mr.

Batten earned a reputation as one of the nation's most able and progressive industrial leaders. He built the company from a shop employing eight people into a world wide operation with 1200 employees.

J. W. COPPOCK, JR., has been appointed as regional representative for the Southwest by the Heltzel Steel Form and Iron Co., Warren, Ohio. He will represent the complete line of concrete batching plants, highway, airport, and bridge equipment.

THE APPOINTMENT OF J. H. SPROULE as vice president and general manager of Rex-Spanall, Inc., New York, N. Y., has been announced by Chain Belt Co., Milwaukee. The New York firm is a subsidiary of Chain Belt, organized last year to market Rex Spanall, horizontal shoring equipment.

STANDARD STEEL CORP. has appointed two new district sales managers in its Road Machinery Div. Frank McMahon

has been named Eastern district sales manager and Floyd Jones is the new Midwestern district sales manager. McMahon will make his headquarters in Long Island, N. Y. Jones will headquarter in the Chicago area.

TWO LINK-BELT SPEEDER CORP. vice presidents, N. V. Chehak and M. P. Luber were recently appointed members of the company's board of directors. Chief Engineer F. J. Strnad was named vice president and chief engineer.

ROBERT E. BROOKER, president of Whirlpool Corp., and three Clark vice presidents, Clarence E. Killebrew, Walter E. Schirmer and John R. Wood, Jr., have been elected directors of Clark Equipment Co. All have been with the company for some time.

THE APPOINTMENT OF Mr. W. H. Bechman to the position of chief engineer for Athey Prod. Corp. has been announced.

## WHAT ABOUT YOU, MR. READER?

Are you still active in the field? Have you moved or changed your position?

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Inside the new mobile field lab, which takes testing facilities to the job site. The Truco Model B portable diamond drilling machine at left is used to cut sampling cores from pavement.

## Mobile Test Lab Has Diamond Core Drill

A specially equipped field laboratory truck will serve Michigan state road projects in 1960. Designed to help make better and faster job decisions affecting quality, the laboratory will be used on bituminous and other projects. According to W. W. McLaughlin, testing and research engineer, two laboratory technicians will man the unit and conduct the tests.

This mobile laboratory supplements conventional testing methods, serving as a "trouble shooter" on jobs where more than the usual quality control is desired.

A Truco Model B portable diamond drilling machine will be used for removing roadway core samples. The unit is lowered to the ground by a hoist and rolled to the coring location on its own wheeled and castored platform. The heavy base has four leveling screws to provide exact adjustment for accurate drilling. Diamond drill bits from 1 to 14 in. diameter are used with the Model B, providing cores of various sizes for different test purposes.

In addition to the normal testing

equipment the truck features its own water tank, gas stove oven and a gasoline generator for powering various pieces of equipment. With its own power and utilities the laboratory is really self-sufficient.

## AISC Scholarship Winners Announced

Ten high school seniors have won \$1,000 scholarships in civil and architectural engineering in the 11th annual scholarship program of the American Institute of Steel Construction.

Competing in the nationwide contest were 75 high-school seniors from 27 states, sponsored by 50 members of the AISC, national organization of the structural steel fabricating industry. Named also were eleven alternates.

D. Ray Park, chairman of the AISC Committee for Education and president of Smith & Caffrey Steel Co., Inc., Syracuse, N.Y., announced the winners, who were selected by a jury of educators on the basis of grades in College Entrance Examination Board tests and high-school records.

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**FIELD ENGINEERS WEIGHED LOAD AFTER LOAD** as the competing units passed over the portable Streeter-Amet Electronic Scale. By subtracting average empty weight from average gross weight, they determined the average net load weight. This and other job studies prove that the new DW21G-470B hauls dirt at lowest cost per cu. yd., regardless of capacity of competing scrapers.

**PROJECT:** South End Shopping Center, Tukwila, Wash.  
**PURPOSE OF STUDY:** To compare production and cost per yard of equipment observed. **EQUIPMENT:** One DW21G with SynchroTouch Transmission Control; two Tractor X (24-yd. struck, plus 36-inch sideboards); and three DW21C (18 yd. struck).  
**JOB CONDITIONS:** **Material**—slightly damp clay with some sand. **Density**—3425 lb./bank cu. yd., average of three tests, oil method. **Haul length**—1300 ft. (one way), return same route. **Haul road conditions**—soft, not maintained during study. **Weight test**—loads weighed with Streeter-Amet Electronic Scales. **Pusher**—all units pushloaded by D9 with Torque Converter Drive.



**NEW CAT DW21G TRACTOR-470B LOWBOWL SCRAPER.** New Turbocharged 345 HP Cat Engine delivers 12% higher rimpull giving up to 20% faster travel speeds under similar haul conditions than the previous model. With SynchroTouch Transmission Control (optional), operator simply dials desired gear for automatic, split-second, touch-and-go response. New 470B LOWBOWL Scraper is rated at 19.5 cu. yd. struck; 27 cu. yd. heaped. LOWBOWL design loads more material faster because of less loading resistance. Result: DW21G-470B moves dirt at lowest cost per cu. yd.

JOB DATA:	Cat DW21G w/SynchroTouch	Cat DW21C	Tractor X
Average Load Time . . .	.73	.75	1.20
Average Haul, Dump and Return Time . . .	4.14	4.67	4.25
Average Wait Time . . .	.44	.44	.44
Average Cycle Time . . .	5.31	5.86	5.89
Average Payload in Bank Yards . . . . .	20.0	17.5	23.9
Trips per Hour . . . . .	11.3	10.0	10.0
Average Hourly Prod. (bank cu. yd.) . . . . .	226	175	239
Owning and Operating Costs per Hour* . . . .	\$20.37	\$18.87	\$31.84
Cost per Yard . . . . .	9¢	10.8¢	13.3¢

\*Hauling costs only—does not include pusher costs

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